LONG-RANGE FARM PROGRAM

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OF MICHIGAN

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READING ROOM

HEARING

BEFORE THE

COMMITTEE ON AGRICULTURE AND FORESTRY UNITED STATES SENATE

EIGHTY-FIFTH CONGRESS

SECOND SESSION

ON

S. 724, S. 1238, S. 2306, S. 3215, S. 3489, and S. 3697

BILLS RELATING TO THE INCREASED USE OF AGRICULTURAL COMMODITIES FOR INDUSTRIAL PURPOSES

JUNE 4, 1958

PART 3

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CONTENTS

Statement of—
Page
Berck, Elton, president, Nebraska Farmers Union, Omaha, Nebr., also representing the National Farmers Union 574
Bescher, Ralph H., assistant to general manager, Wood Preserving division, Koppers Co., Inc., Pittsburgh, Pa 591
Blake, William Rhea, executive vice president, National Cotton Council of America 504
Bruett, Charles, secretary of agriculture of the State of South Dakota, Pierre, S. Dak 497
Capehart, Hon. Homer E., a United States Senator from the State of Indiana 395
Case, Hon. Francis, a United States Senator from the State of South Dakota 480
Curtis, Hon. Carl T., a United States Senator from the State of Nebraska 413
Dixon, Hon. H. A., a Representative in Congress from the First Congressional District of Utah 534
Evans, James W., director of research, American Maize Products Co., Roby, Ind 562
Faucett, James W., director, manufacturing and engineering, Takamine division of Miles Laboratory, Clifton, N. J 567
Greene, Ernest W., president, Sugar Association 525
Hall, Hugh F., legislative assistant, American Farm Bureau Federation 584
Harvey, Hon. Ralph, a Representative in Congress from the 10th Congressional District of Indiana 512
Hussey, Frank W., executive vice president, Potato Industry Council of Maine, Presque Isle, Maine 521
Lambert, W. V., dean, College of Agriculture, University of Nebraska, Lincoln, Nebr 542
Laxer, Gerald, director of science and technology, Wool Bureau, Inc., New York, N. Y 551
Levitt, D. M., president, DCA Food Industries, New York, N. Y 548
Prochaska, F. J., vice president in charge of production, engineering, and research, Grain Processing Corp. and Kent Feeds, Inc., Muscatine, Iowa 513
Stoddard, Charles H., technical forestry consultant, Douglas County (Wis.) Industrial Development Committee 580
Welsh, J. Leroy, president, Butler-Welsh Grain Co., Omaha, Nebr 485
Miscellaneous documents—
S. 724, 85th Congress 401
S. 1238, 85th Congress 460
S. 2306, 85th Congress 460
S. 3215, 85th Congress 463
S. 3489, 85th Congress 463
S. 3697, 85th Congress 464
Statements filed by:
Hon. Phil Weaver, a Representative in Congress from the First Congressional District of Nebraska 422
John J. Hamel, Jr., executive director, National Renderers Association, Inc., Chicago, Ill 423
Marshall E. Leahy, executive vice president, Farmers' Rice Growers Cooperative, San Francisco, Calif 423
R. D. Lewis, director, Texas Agricultural Experiment Station, College Station, Tex 424
A. E. Thorpe, executive vice president, Dried Fruit Association of California, San Francisco, Calif 428

Statements filed by—Continued
Page
Marshall Ballard, Jr., president, American Tung Oil Association, Lumberton, Miss. 429
V. Conquest, vice president, research division, Armour & Co., Chicago, Ill. 433
Merle A. Delph, president, M. A. Delph Company, Inc., Indianapolis, Ind. 434
National Council of Farmer Cooperatives. 435
R. B. Taylor, administrator, Oregon Wheat Commission, Pendleton, Oreg. 436
George E. Johnson, chief engineer and manager, steam generating division, Central Nebraska Public Power & Irrigation District, Hastings, Nebr. 440
Marvin W. Swaim, president, Alton Box Board Co., Alton, Ill. 442
K. Starr Chester, technical adviser, paperboard division, Alton Box Board Co., Alton, Ill. 443
R. H. Richards, vice president, International Shoe Co., St. Louis, Mo. 443
Willard C. Lighter, executive vice president, Glidden Co., Cleveland, Ohio. 444
Donald F. Othmer, professor of chemical engineering, Polytechnic Institute of Brooklyn, Brooklyn, N. Y. 446
Donald M. Counihan, on behalf of the American Corn Millers' Federation. 450
Hon. Willian Proxmire, a United States Senator from the State of Wisconsin. 455
K. S. Dickinson, president, Tomahawk Pulp Co., Appleton, Wis. 457
Frank W. Christopherson, Jr., Superior, Wis. 459
Hon. John D. Hoblitzell, Jr., a United States Senator from the State of West Virginia. 521
Herschel D. Newsom, master, National Grange. 570
John C. Lynn, legislative director, American Farm Bureau Federation. 587
Hon. Roman Hruska, a United States Senator from the State of Nebraska. 596
Excerpt from report of Commission on Increased Industrial Use of Agricultural Products relative to forest products research. 456
Report by Science Division, Library of Congress, on power alcohol. 468

LONG-RANGE FARM PROGRAM

WEDNESDAY, JUNE 4, 1958

UNITED STATES SENATE,
COMMITTEE ON AGRICULTURE AND FORESTRY,
Washington, D. C.

The committee met, pursuant to recess, at 10:05 a. m., in room 324, Senate Office Building, Senator Allen J. Ellender, presiding.

Present: Senators Ellender (chairman), Johnston, Symington, Talmadge, Proxmire, Aiken, Young, Mundt, Williams, and Schoeppel.

Also present: Senators Capehart and Curtis.

Senator JOHNSTON. We will come to order.

We are fortunate this morning to start off with Senator Capehart of Indiana.

We are always glad to have you come before our committee.

STATEMENT OF HON. HOMER E. CAPEHART, A UNITED STATES SENATOR FROM THE STATE OF INDIANA

Senator CAPEHART. Thank you, Senator Johnston.

I have a prepared statement here, but I notice you have a lot of witnesses today.

Senator Johnston. We do.

Senator CAPEHART. I am going to, with your permission, file my statement and ask that it be printed in the record, and then I will talk extemporaneously for a few minutes about my statement and bill.

Senator JOHNSTON. We will be glad for you to do that, sir.

(The statement in full is as follows:)

Mr. Chairman, to you, Mr. Chairman, and to all of the members of the committee I want to express my deep appreciation for the opportunity to appear here today in support of legislation which is and has for a long time been very close to my heart.

That proposed legislation would provide for a research and development program under the sponsorship of the Federal Government to discover and perfect new industrial uses for the everyday products of the American farm.

Mr. Chairman, with the assistance of many top experts in the field, I first proposed such a program in the 84th Congress when I, together with more than 30 cosponsors, introduced a bill on March 21, 1956. Senate bill 724, which now is before this committee, is a duplicate of the original bill and it likewise is supported by more than 30 Senators who have joined as cosponsors.

The committee has before it also Senate bill 3697 introduced by Senator Olin D. Johnston and Senate bill 2306 introduced by Senator Carl T. Curtis, implementing the recommendations of the Commission on Increased Industrial Use of Agricultural Products.

The principle involved in all three bills is exactly the same and that principle has my wholehearted support despite some variance as to administrative details. I have been very happy and appreciative of the opportunity to join with Senator Curtis as a cosponsor of his bill and certainly I lend my support to the principles incorporated in the bill introduced by Senator Johnston.

When I proposed the first bill in the 84th Congress, I told the Senate that I considered this bill "the most important program I ever have sponsored" in my tenure in the Senate.

I am now more convinced than ever that this is true. It is a program which is all pluses and no minuses. It is good for everybody.

It is a matter of very great satisfaction to me that my belief in the program and in the benefits which all of our people would derive from it was confirmed by the findings of the Commission on Increased Industrial Use of Agricultural Products created, with the approval of this committee and of the Senate, in the 84th Congress.

The able men who gave of their time, effort and resources to compile their findings in Senate Document 45 of the first session of this Congress have my heartiest congratulations. They performed a real public service.

As I have said, bills implementing the findings and recommendations of that Commission now are pending before this committee. They have my wholehearted support.

I have no pride of authorship in this matter. My concern is to get the job done and get it done now, because what here is proposed is of vital importance to every man, woman, and child in the United States.

It would produce hundreds of thousands of new jobs. It would substitute a positive approach for a negative effort to solve our farm problem.

It would, in fact, solve our farm problem for all time to come because it would assure that a farmer would have a demand for everything he could grow on his acreage and thus receive a fair price for his products.

It would end, once and for all, too, our costly farm surplus problem.

Now, let's see what this alone would mean—the end of surplus accumulation.

For purposes of discussing this point, let us assume that the Congress should follow the recommendation in Senate bill 724 and appropriate $100 million to get the program underway.

Gentlemen, $100 million is less than one-third of the amount the Government has been spending just to store the vast surpluses for the last few years.

But, important as that financial saving would be, such a saving would be as a drop in the bucket when contrasted with the overall benefits accruing from such a program.

For, I am convinced that a properly directed research and development program would, within a few years, create a demand for farm products in industry at least equal in amount to that now consumed for human consumption and other purposes in the United States.

In other words, I believe it is safe to assume that such a program would double the farm market.

No longer would it be necessary to expend billions of dollars a year of taxpayers money to acquire surpluses to sustain the farm economy.

No longer would it be necessary to pay our farmers not to produce their maximum. The demand would be there for everything a farmer could grow. It is obvious that such a situation would insure the farmer a good price for his maximum production. That is what I mean by the positive as opposed to the negative approach to the farm problem.

For the farmer, this would mean a whole new era of prosperity.

But, this again is only a part of the benefit accruing from such a program.

Research would develop new products. New products would create demands for new production facilities. New production facilities would create new jobs. New jobs would create new wealth, a more stable economy, and a better life for our people.

New production facilities, new factories, would create demands for more of everything—transportation, machinery, wholesale and retail outlets to meet the new demands for everything business has to sell.

There is no question that the job can be done. We know enough now about the results of research in this field that the possibilities—at least to those who have studied them intensely—are almost limitless.

Simply to develop to their ultimate possibilities the new uses we already know about would produce new activity almost staggering the imagination. And, it has been fairly well established that the surface of such possibilities has barely been scratched.

What we must do is take the blinders off, as it were, of our agricultural research program. We must throw the full white light of technical research and development, experimentation, test facilities, pilot plant operations, and American technical know-how into an all-out effort to discover and perfect new industrial uses for just the everyday products of our land.

Now, I don't want to be misunderstood about existing research. The Department has been doing some. Our fine agricultural and technical schools are working at it constantly. We have some very limited utilization research plants under

Government management. Within their limited facilities, all of these agencies have been doing a good job.

But, what I am talking about here is a much more comprehensive effort, a job with top priority under the direction of an administrator or administrative board with ample funds and the authority to knock heads together, if necessary, to get the job done.

A good example of the type of operation I am talking about is the research program which brought us synthetic rubber during the war. The Government brought in Mr. William R. Jeffers of railroad fame and said to him: "Here's the money. Here's the authority. Get the job done."

As you all know, he did get the job done. And, with the enactment of legislation such as that pending before this committee, we can get this job done, too. Now is the time to start.

It is my best judgment that we would begin to see tangible results of such a program within a reasonably short time. I believe that the Department of Agriculture and our research people have enough technical knowledge right now that, given a real opportunity to carry through, they can find industrial uses for 5 billion additional bushels of grain—corn, wheat, rye, barley, oats, rice, sorghum grains, and others—each year.

Remember that we produce only about 6½ billion bushels now and that in some years as much as one-third of that amount has been surplus. It takes about 180 million acres to produce our present output. Add another 5 billion bushels to a real and continuing demand for grains and you begin to see the almost fantastic possibilities of this program we are talking about.

Then, we must face realistically another agricultural problem growing, ironically enough, from discoveries of our vast private industrial research programs. They are developing substitutes, particularly in the fabrics field—substitutes which can in the end only aggravate our surplus problems unless we create new markets to offset the substitute uses.

The great chemical and petroleum industries have developed, through research programs, ways to make everything from rubber to clothing materials from substitutes.

These research programs have developed in substantially the same proportion to the amount of money industries have plowed back into research from their profits. Our most successful industries are those which have devoted and are devoting more and more attention to research.

Now, some have said that our 6 million farmers ought to do this for themselves. I wish they could. But, I believe there is general agreement among those who have studied the problem that here is a job the farmers simply cannot do for themselves.

Gentlemen, Government spends a great amount of money for agricultural research every year. But, what we are doing is teaching the farmer how to grow more and more without giving the proper attention to finding new markets for his ever-increasing production.

It is simply a "must" that we spend at least as much money for research to develop new markets as we do for the development of new production methods.

At the same time, it is essential that we continue to find new ways to increase production. The money we put into that program is well spent by the Department of Agriculture and our great agricultural schools. But, we must, at the same time, be realistic enough to recognize that there must be markets for every ounce of our production if we are to maintain a stable, healthy, prosperous farm industry.

Let me give you one very simple, understandable example of what I am talking about.

Most of us remember not too many years ago when the production power on the farm was restricted to animal power, horses and mules. It has been estimated that this animal power consumed the production equivalent of some 80 million acres of feed grains.

Now, the animal power is obsolete and there has been little or no research to develop new markets for the production of that 80 million acres. It's just as simple as that. Add to that the increased production from better seeds, fertilizers, improved insecticides and you begin to see why, in the best fed nation in the world, we continue to have farm surpluses.

These are some of the reasons we have found it necessary to pass laws curtailing production, the negative approach, instead of providing the Government leadership which would create the markets to encourage every farmer in the land to grow everything it is possible to get from his land.

Since Congress long ago established as public policy the Federal Government's responsibility to nurture our vast agricultural industry, it seems crystal clear now that this responsibility extends to the development of new markets for what we grow. It is the only way I know or have heard of to end our farm problem and insure a sound, stable farm economy for the years ahead.

There just can't be any question that this is the answer to the farm problem. It has to be the answer.

In addition to solving the problem of surpluses, it would save billions of dollars in support programs, vastly increase farm income, boost tax revenues, stimulate business through increased purchasing power, and create millions of new jobs.

I believe you all are familiar with what research did for the citrus industry at a time when it admittedly was in bad shape. The quick freezing process, perfected in part through research conducted by our own Department of Agriculture, reversed that economic trend. Not only was the industry stabilized, but new demands brought vast expansion, and every man, woman, and child in the United States enjoyed a potential benefit because of the greater accessibility of the healthful benefits of fresh citrus fruit juices.

Then, have a look at what once was called the lowly soybean. The earliest records show that a Chinese emperor in 2838 B. C. wrote of the highly valued nutritional qualities of the soybean. Yet it was not until about 1930 that research spearheaded by the late Henry Ford—research for industrial uses of the soybean—that this crop started the upward trend that has made it one of the great money crops of today.

Those are examples we all know about and none can deny. Examples of what? Examples of just what we are here talking about—research.

Some work has been done on the development of powdered whole milk. It would be difficult to estimate what perfection of that process to commercial practicability would mean to the dairy industry and, again, with humane benefits to every man, woman, and child in the Nation.

I believe the perfection of the process would double the demand for milk. That means twice as many cows, twice as many dairy facilities, twice as much business. That means more jobs. There is example after example just as startling.

Now, of course, to develop most products to the state of commercial practicability would require pilot plants, new machinery types, field tests. Then with the perfection of a new process, private industry would begin, under license, to produce the new product, bringing demands for new advertising, merchandizing, and sales organizations.

Now, gentlemen, let us for the purposes of this statement, discuss just exactly how S. 724 would work:

There is created in the executive branch of the Government an Industrial Agricultural Products Administration under the administrative direction of an Administrator, to be appointed by the President by and with the consent of the Senate.

The Administration shall conduct research, both scientific and chemical, make field studies, conduct both laboratory and field experiments, test production procedures on a commercial basis, maintain and expand pilot plants whenever necessary, maintain and operate manufacturing facilities where necessary to prove the commercial feasibility of volume production, and otherwise promote the finding, development, and commercial use of new, increased, extended, and perfected processes, techniques, and programs for industrial uses of greater quantities of agricultural products.

The Administration would be empowered to utilize existing facilities of the Government to carry out the program. It could build, purchase, or lease plant facilities, necessary equipment, pilot plant, manufacturing, or other needs to carry out the program.

In addition to this, however, the Commission might employ private industry—individuals, firms, institutions, and organizations—and the services of land-grant colleges and universities to conduct research. Incentive awards are provided for. Industry advisory committees would cooperate. Consultants might be employed with only per diem pay. Grants to accredited schools, colleges, and universities for fellowships and scholarships in research are authorized. The Administrator would be required to report semiannually to the Congress.

Now, Mr. Chairman, at this point the bill makes additional provisions for the participation of private enterprise. It is provided that the Industrial Agricultural Products Agency of the Department of Agriculture may license, at a fair and reasonable royalty, any person, firm, or corporation to use any process

developed by the Agency or to make and sell under any patent, or application for patent of the Agency. Such royalties shall be based upon fair compensation to the Government for its investment and shall be nondiscriminatory. Whenever the Administrator finds it in the public interest to do so, he may grant royalty-free licenses for processes developed under this act, including the right to make and sell under any patent or application for patent of the Ageny. The members of this committee or Senators other than members of this committee, I am certain, may have additional constructive and worthwhile ideas on the subject. Certainly, I am amenable to and will welcome such suggestions.

Yes, gentlemen, the possibilities are limitless, the potentiality so great as to require every bit of the imagination which has made America the great Nation it is.

Let me list a few more possibilities:

1. A high protein cattle food that could consume an additional 150 to 160 millions of bushels of wheat a year, the production equivalent of 7½ million acres.
2. Metallurgical oils from grain.
3. Oil, as a grain derivative, for use in the manufacture of paint.
4. Ethyl alcohol, for use in producing synthetic rubber, from grain. One ton of rubber would consume 350 bushels of grain. Multiply that by the 900,000 tons of synthetic rubber we produce a year and it comes up 315 million bushels of grain, the production equivalent of about 7 million acres.
5. Microba rubber, a natural product, from the gluten in grain.
6. Ethyl alcohol from grain to be blended with gasoline. If just 10 percent of the blend was ethyl alcohol made from grain, it would require more than 2 billions of bushels of grain a year. That alone would absorb the grain surplus.

Now, there are many more potential uses we already know about. Some say, and correctly so, that the cost of some of these uses would be so great as not to be practicable or competitive. Who knows? Finding ways to reduce the cost, make the uses practicable and the products competitive is just exactly what research programs—programs such as the one we here propose—are for.

Mr. Chairman, I have listed a few of the better known possibilities for new industrial uses which we all know about, but I believe it might be helpful if I should record here, in order, the list of known uses given to me by the Department of Agriculture. The Department has estimated that these 11 uses would consume 2.6 to 2.7 billion bushels a year if fully developed by the program here proposed. They are as follows:

1. High protein food by fermentation, 150 million bushels a year.
2. Paint from vegetable oil, if 5 to 10 percent of the potential market is reached, 15 to 60 million bushels a year.
3. Synthetic rubber, 365 million bushels a year.
4. Microbia rubber, if 10 percent of the potential market is reached, 25 to 30 million bushels a year.
5. Increased use of starch in paper, 40 to 100 million bushels a year.
6. Industrial exploitation of oxystarch, 10 million bushels a year.
7. Raising disease-free poultry for export, 13 million bushels a year.
8. New drug plants, 4½ million bushels a year.
9. Hardboard, boxboard, and building board from wheat, 20 to 40 million bushels a year.
10. Development of high amylose corn, 10 million bushels a year.
11. Blending 10 percent grain alcohol with gasoline, 2 billion bushels a year.

There are a great many other possible uses which have been called to my attention. These include smokeless powder, plastics, medicinals, toilet preparations, soaps, cleaners, anesthetics, antifreeze, dyes, varnishes, power, and fuel.

Who knows, Mr. Chairman, but that a program such as this may some day solve the problem of our paper supply, now almost altogether limited to the pulpwood industry? I can foresee the day that we may raise our entire paper supply right on our farms.

I could go on and on with possibilities. New ones are reported from time to time. But, they are going to remain just possibilities unless we do something about it and do it now.

The Commission on Increased Industrial Use of Agricultural Products, to which I referred previously, outlined 106 broad fields of research and development. They include cereal grains, cotton, oilseeds, meat and animal byproducts, sugar, fruit, vegetables, edible tree nuts, white potatoes, poultry and eggs, crop residues, forest products, and new crops.

A program such as we here are discussing is gaining recognition in many circles and in some high places, including the Office of President of the United States. Let me quote briefly from President Eisenhower's message on agriculture:

"The scientific revolution in agriculture is irreversible and is continuing. It cannot be avoided and it need not be feared. In recognition of this basic fact, we must find ways of utilizing more completely the abundance that our farm people are now able to produce; we must find ways of further expanding markets for this increased production, not only among our own citizens but among people all over the world who need the food and clothing we produce in such abundance."

Then, the President proceeded to include as 1 of his 9 recommendations for agriculture this quotation:

"Research efforts aimed at increasing industrial uses of farm products should be expanded * * * To a greater degree than at present, these raw materials can be used in industry, thereby broadening markets for our abundant farm products. New uses and new markets can be developed for our surplus crops * * *."

I am sure that most of you are familiar with and admire as I do the work of Mr. Wheeler McMillen, vice president of the Farm Journal and a recognized authority in this field. Called upon to comment in 1956 on the first bill of which I was the principal author, Mr. McMillen said, in part:

"If the Congress will adopt the principles of this bill and will provide adequate funds through the years, it will have taken the longest and soundest possible step toward making agriculture a permanently prosperous, expanding industry.

"It will add new products for the American standard of living. It will build new factories and create new jobs for years ahead.

"It will provide for American industry unfailing sources of raw materials, materials which will ever be renewable, annually reproductive as long as soil and water are conserved.

"It can in time remove, probably forever, the urgency of agricultural subsidies.

"It will work toward making American agriculture the growth industry that farmers want it to be. It will provide expanding opportunity for the family farm. It will make it possible for our fine farm boys and girls to live and prosper on the land they love.

"This proposal offers, in short, an infallible plan toward a richer rural civilization and, therefore, toward a better America."

Mr. Chairman, I cannot conceive of a finer tribute from a more qualified spokesman than this statement by Wheeler McMillen.

In this position, he is joined by very distinguished company, including the heads of our farm organizations, deans of schools of agriculture, farm-publication policy makers, newspaper editorial writers, scientists, economists, and many others.

The principle involved here has been supported by the American Farm Bureau, the National Grange, National Council of Farmer Co-ops, National Farmers Union, Reed Research, Inc., National Cotton Council, Corn Industry Research Foundation, National Farm Chemurgic Council, various leaders of organized labor, leading research scientists, experts from agricultural colleges, the Farm Journal, the Chemurgic Digest, the Oil and Gas Journal, the Indiana Farmers Guide, the Washington (D. C.) Star, Chicago Tribune, Cleveland Plain Dealer, Indianapolis News, Indianapolis Times, Indianapolis Star, South Bend Tribune, Hammond Times, Plymouth (Ind.) Pilot-News, Philadelphia Inquirer, Omaha World-Herald, Syracuse (N. Y.) Standard, LaPorte (Ind.) Herald-Argus, Kokomo Tribune, Lafayette Courier-Journal, and other farm magazines and newspapers.

Mr. Chairman, I have the greatest admiration for our great schools of agriculture, one of the finest of which, Purdue University, is in my home State of Indiana. They have been and are doing an outstanding job. They are doing a great job for our agricultural industry.

So are our county agents, our extension schools and our 4–H Clubs. They have helped immeasurably to make ours the best fed nation in the world. Every cent spent on their activities has been well spent. We should continue their programs and make them ever expanding. The part they could play in the research program here suggested would be just as immeasurable—just as valuable.

But, again I want to say that we are faced with the practical necessity of finding markets for the products of our agricultural industry. No industry can long thrive when it continues to produce more than it has a market for. The only way I know to solve that problem for agriculture is to find new uses for farm products in industry. We need to spend just as much money on that kind of program as we now spend to improve our production.

As a businessman and a farmer, I know of only two ways to increase business. One is to sell more goods to existing customers. The other is to find new customers. We are selling all we can of our farm produce to existing customers. So, we must find new uses and new customers if we are going to solve permanently the farm problem.

Again I want to say, Mr. Chairman, that I have no pride of authorship in this matter. I have been very happy for the opportunity to join with Senator Curtis as a cosponsor of his bill implementing the recommendations of the Commission on Increased Industrial Use of Agricultural Products. Thus, the administrative procedures, if they are sufficient, and the amount of appropriation, if it is adequate, are not of primary concern to me. What is of concern to me and I believe to most professional men in the field, is the necessity of getting this program underway at once.

If at any time I can be of assistance to the committee in any way in this matter I stand ready to do so.

Again, thank you for the opportunity to appear.

Senator CAPEHART. I would also like to have printed in the record a copy of S. 724, which I introduced along with 33 other Senators on January 17, 1957. It is identical to S. 3503, 84th Congress, which I introduced along with some 30 other Senators on March 21, 1956. I ask that it be printed as part of my remarks.

Senator JOHNSTON. We will be glad to have that done.

(S. 724 is as follows:)

[S. 724, 85th Cong., 1st sess.]

A BILL To provide for a scientific study and research program for the purpose of developing increased and additional industrial uses of agricultural products so as to reduce surpluses of such products and to increase the income of farmers, and for other purposes

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

DECLARATIONS AND FINDINGS

SECTION 1. The Congress of the United States hereby makes the following declarations and findings concerning the development of new and additional industrial uses for agricultural products:

(a) Current productivity of farms in the United States is substantially in excess of current markets for their products at price levels which provide fair and substantial income to farmers.

(b) National defense and the security interests of the United States require increasing and expanding agricultural productivity to meet possible emergency needs of the United States and its allies, which productivity cannot be achieved or maintained at depressed farm prices resulting from overproduction or with acreage curtailments to avoid overproduction.

(c) It is in the national interest of the United States to increase the level of farm income in order that farmers may continue to share to a greater degree in the general prosperity of the Nation.

(d) No program has been developed, and none can be foreseen, that can successfully shrink farm production for an extended period of time; but research programs provide known means potentially to increase substantially the industrial uses of agricultural products and thereby to achieve farm prosperity based on full, rather than curtailed, production.

(e) Research facilities, both private and public, including those of land-grant colleges and universities, can and should be utilized for an all-out attack on the development of increased and additional industrial uses of agricultural products to enlarge opportunities for increased production by farmers and to reduce Government costs for the acquisition, storage, and ultimate disposition of agricultural commodities which are now a substantial financial burden to the Government.

(f) The cost to the United States of such a research program may be expected to be more than offset by increased tax revenues resulting from increased earnings of both farmers and those who sell goods, wares, and merchandise to farmers, as well as by savings to the United States in costs of current agricultural assistance programs.

PURPOSES

SEC. 2. The purposes of this Act are to find and develop through research, sponsored and financed by the United States, new industrial uses, and increased use under existing processes of agricultural products.

ADMINISTRATION CREATED

SEC. 3. There is hereby created in the executive branch of the Government an Industrial Agricultural Products Administration (hereinafter referred to as the Administration), in which is vested the duties, powers, and responsibilities hereafter set out in this Act. Such powers, duties, and responsibilities of the Administration shall be vested in an Administrator, who shall be appointed by the President, by and with the advice and consent of the Senate, and who shall serve during the pleasure of the President. The Administrator shall receive compensation at the rate of $22,500 per annum.

DUTIES, POWERS, AND RESPONSIBILITIES OF THE ADMINISTRATION

SEC. 4. The Administration shall conduct research, both scientific and chemical, make field studies, conduct both laboratory and field experiments, test production procedures on a commercial basis, maintain and expand pilot plants whenever necessary, maintain and operate manufacturing facilities where necessary to prove the commercial feasibility of volume production, and otherwise promote the finding, development, and commercial use of new, increased, estended, and perfected processes, techniques, and programs for industrial uses of greater quantities of agricultural products.

POWERS OF THE ADMINISTRATION AND THE ADMINISTRATOR

SEC. 5. The Administration is authorized to—

(a) Utilize such existing facilities of the United States, and such trained personnel employed by the United States, as the President finds can feasibly be transferred to the Administration for carrying out the purposes of this Act. The President is hereby authorized to (1) transfer any such facility, facilities, or personnel to the Administration, or to (2) make any such facility, facilities, or personnel available to the Administration for carrying out the purposes of this Act.

(b) Build, purchase, or lease plant facilities, or necessary equipment, suitable for research, pilot plant, manufacturing or other needs of the Administration in carrying out the purposes of this Act.

(c) Employ such personnel as may be necessary to carry out the purposes of this Act; and all technical or scientific employees engaged for research by the Administration shall be exempt from the civil service laws and regulations.

(d) Employ or retain on a contract basis individuals, firms, institutions, and organizations, public and private, including land-grant colleges and universities, to conduct research programs for the Administration pursuant to this Act.

SEC. 6. The Administration is authorized to pay incentive awards to private citizens for suitable and acceptable suggestions to implement the program established by this Act, such payments to be made in accordance with previously published rules stating the amounts of, criteria for determining, and subjects of, such awards.

SEC. 7. The Administrator is authorized to appoint Industry Advisory Committees and to employ consultants without compensation or at rates of compensation not to exceed $50 per diem.

SEC. 8. The Administration may make grants to accredited schools, colleges, and universities for fellowships and scholarships in research for the purposes of this Act.

INDUSTRIAL AGRICULTURAL PRODUCTS AGENCY CREATED

SEC. 9. There is hereby created in the Department of Agriculture an Industrial Agricultural Products Agency (hereinafter referred to as the "Agency"). The duties, obligations, and responsibilities of the Agency shall be carried out by and under the direction of the Secretary of Agriculture.

DUTIES AND RESPONSIBILITIES OF THE AGENCY

SEC. 10. Under the delegations, directives, and policy determinations of the Administrator, the Agency shall carry out all of the duties, obligations, and responsibilities imposed upon the Administration by this Act, including the

making of research contracts, employment of personnel, contracts for the construction, purchase, lease, or other acquisition of real or personal property, and the maintenance of all records, files, studies and other data undertaken pursuant to this Act. Notwithstanding any other provisions of this Act, the Administrator may delegate any power given him hereunder to the Agency, and he may control, supervise, and direct all Agency action permitted by law under this Act.

SEC. 11. The Administrator shall report semiannually to the Congress progress on research programs undertaken pursuant to this Act to find and develop new and increased industrial uses for agricultural products.

SEC. 12. The Agency may license, at a fair and reasonable royalty, any person, firm, or corporation to use any process developed by the Agency or to make and sell under any patent, or application for patent of the Agency. Such royalties shall be based upon fair compensation to the Government for its investment and shall be nondiscriminatory. Whenever the Administrator finds it in the public interest to do so, he may grant royalty-free licenses for processes developed under this Act, including the right to make and sell under any patent or application for patent of the Agency.

APPROPRIATIONS

SEC. 13. There is hereby authorized to be appropriated to the Department of Agriculture, for the Industrial Agricultural Products Agency, the sum of $100,000,000 for the fiscal year beginning July 1, 1956, and the same amount annually thereafter. There shall be paid out of such appropriations the salary of the Administrator as well as all other expenses of his office. The President is authorized to transfer to the Agency $1,000,000 out of unexpended Agricultural Department funds to initiate promptly this program following the enactment of this Act for and during the fiscal year ending June 30, 1956.

Senator CAPEHART. Then, Mr. Chairman and members of the committee, I first want to say this: that I have read the 3 bills pending before this committee on the subject of finding new uses for farm products in industry, the bills introduced by myself and some 30 other Senators, a bill introduced by the acting chairman, Mr. Johnston of South Carolina, and the bill introduced by Senator Curtis and myself and many other Senators.

All three of those bills endeavor to do substantially the same thing. By way of explanation, I think this Congress and this administration ought to do the following:

Putting it in its briefest terms and getting right down to the point, right down to the meat of it, and I think this is the best way to put it: We have been spending for the last 100 years, through out Department of Agriculture in Washington, through our fine agricultural colleges throughout the Nation, through private industry which has been improving seeds, farming methods and farm machinery, billions and billions of dollars to show the farmer how to grow more and more and more, and the end result is that for the last 25 years, at least, the farmer has been growing each year more than he could sell and more than the people of the world would consume for food purposes.

Even after the Federal Government has spent literally billions and billions of dollars paying him for not growing or reducing his acreage, this huge surplus has accumulated in spite of the fact that the taxpayers have spent literally billions and billions of dollars paying the farmer for not growing. Accordingly we have this huge figure of billions and billions of dollars which we, as Americans, meaning the Department of Agriculture, your universities, private industry, the taxpayer, have spent and yet we have a surplus.

Now I am glad we have spent the billions of dollars to show the farmer how to grow more and I am not advocating that we discontinue this at all. I think the Department of Agriculture has done a good job generally speaking, and your agricultural colleges have done a good job and I am not criticizing them at all.

All I am advocating and all these three pieces of legislation advocate is that we, the Federal Government, spend a hundred million dollars to find new uses for farm products in industry and new markets for farm products so that the farmer can till all of his acres, grow as much as he can grow and have a market for it.

In other words, I think the least we can do, as a government, is to spend as much money finding markets and new uses for farm products as we do to show the farmer how to grow more and more.

In other words, what good does it do to spend hundreds of millions of dollars to show the farmer how to grow more and more and then after he has grown it, find that his crop is a drug on the market and pushing down the prices of the normal amount of crops that he might grow.

Now that is the purpose of the three pieces of legislation.

One of the pieces of legislation grew out of a commission that was set up by this committee, by the Senate, and by the Congress, to study the problem. This committee was headed by Mr. Welch, of Omaha, and I think Congress appropriated something like a hundred thousand dollars to make that study and this commission spent a year making the study.

Mr. Welch's committee filed its report, I believe, last March in which it made certain recommendations. The recommendations it made in substance were about the same as the bill that I introduced along with some 30 others, and also about the same as the bill that Senator Johnston of South Carolina introduced, namely, that we spend money to find new uses for farm products in industry and to find new markets.

Now we can never, in my opinion, solve the farm problem until we do that.

Other countries throughout the world are going to grow more foodstuff. If we are going to take the shackles off the farmer and permit him to grow as much as he can grow, we are going to have to find more uses for farm products in industry.

Now you will have people who will testify here that the Department of Agriculture now has four laboratories, research laboratories doing this work, and I agree that they are doing a good job. But it is not good enough in my opinion. We must move faster, appropriate more money, and have more people do this work.

We cannot afford in my opinion to delay the matter any longer for the reason that this year it is costing the taxpayer approximately $4 billion to support farm prices.

It is costing another $365 million a year, a million dollars a day, to store the surplus.

Now we must expand these research laboratories; we must do what these three bills, any one of which are good, call for, if we are going to solve the farm problem, because I do not think we can continue, I do not think we should ask the taxpayers to continue to put up $4 billion annually when there is a better way to do this, namely, to spend a small amount of money and find new uses for farm products in industry.

Many people, as I said a moment ago, tell you it cannot be done. I say it can be done. I say to you we would be a little struggling country here today if it had not been for the fact that private industry has spent literally billions and billions over the years finding new methods and new products to manufacture and process and sell.

Unfortunately, this is a peculiar problem, because the farmers cannot do this job of research themselves, since there are about 6 million of them, and you just cannot get them together.

There is no way they can do it, and this is one of the problems that the Federal Government ought to do something about.

Now we are only advocating that the Federal Government take the initiative, that the Federal Government set up the organization and then employ private industry in every instance where possible to do the research.

All three of the bills under consideration require that once a new product has been perfected that product be turned over to private industry to do the research.

It is not intended under any of these bills that the Government will do anything but sparkplug the research with a certain amount of money.

How much money, I don't know. My bill calls for a hundred million. I forget the amount that Senator Johnston's bill calls for.

The third bill, the Curtis bill, the Commission's recommendation is 15 percent of the tariffs. However, I do not think the amount is the principle question at all.

I would say this: If you could do the job by spending a billion dollars it would be the best billion dollars that this Congress ever appropriated because the taxpayers would save $4 billion a year in subsidies plus $365 million a year in storage.

That is not the big thing that we will save in doing this. The big thing we will save, if we can do it, if we can find new uses for farm products in industry, if we can find new things for the farmers to grow that they are not growing and the amount that can be used in industry, is what it will mean to the economy of America.

It will mean, No. 1, that the taxpayers get out of the farming business to the extent of $4 billion a year.

No. 2, it will mean that the farmers can farm the land in any way they see fit.

No. 3, it means this—which is possibly as big as those things: It means bigger income to the farmer; thereby he would pay more taxes, but it likewise means this: That if we could till every tillable acre of the United States and grow more, it means this: The railroads and the truckers will haul more, the retail stores that sell the farmers will sell more tractors, more oil, more gasoline, more of everything the farmer buys.

The manufacturers who manufacture things for the farmers will sell more to the farmers, thereby employing more people.

It likewise means that this country will have to have new processing plants and new physical properties to handle these things and that means what? That means building and construction. That helps the general economy of the Nation.

In other words, our general economy will go up, and everybody will benefit. We will create more jobs, more taxes. Retailers will have more business, manufacturers more business, the railroads more business, the truckers more business.

You will help the general economy as well as helping the farmer and if you don't go this route, if you don't find new markets and new uses for farm products and we must continue as we are at the moment, what does it mean?

It means you are trying to increase the general economy of the United States by pushing one part of your economy, the farmers, down, because what are we doing now?

We are saying to the farmer, "You can only till 80 percent of your acres and leave the other 20 percent lie idle and we will pay you for doing so."

So the way we have been doing it it has been costing the taxpayers billions and billions of dollars.

The farmers have been making less money; the retailers have been selling less, wholesalers less, manufacturers less, less jobs, and you have been creating and you will continue to create a very, very bad social problem among your farmers, because this whole problem is unfortunately mixed up in politics.

So there is not a single thing against doing what we are advocating in these bills.

Now the chief resistance we will get is the argument that it just cannot be done. Then there will be certain people in the Department of Agriculture who will tell you, "Well, we are doing all we can do now."

I do not believe it.

Then you will have other people opposed to this because they think it is going to take certain prerogatives away from the Department of Agriculture or the people. I don't believe that either.

I am outlining for you the resistance we have encountered over the last few years in respect to this whole matter.

You will have some private enterprise organizations in the United States who are opposed to it because they feel that it may hurt their business.

Well, I say to you they are shortsighted because any new product that is developed here or any improved product, private industry will process it, they will handle it.

They will manufacture it. They will distribute it, they will sell it, and I do not know why, being a manufacturer myself and having been in business for 35 years—I would just as soon manufacture and sell one thing made out of one substance as I would another.

So there is no valid argument that any private group of enterprisers can urge against this legislation.

There is certainly no valid argument that any department of government can urge against this legislation, there certainly is none that our colleges, our agricultural colleges, can put up because they will be doing the research, and the bills—I think all three call for scholarships for teaching the boys and girls of America to learn this sort of scientific development.

So there is not anything against it.

Now there is the other fellow who says, "Well, it just cannot be done." Well, maybe he is right. I do not know.

But I know one thing. We will never know whether he is right or wrong until we try it, and I do know that if we can make it work what a wonderful thing it would be for the world. I think we ought to try it. Those who say it will not work are the same as those who possibly advocate that we spend $4 billion or $5 billion a year teaching or showing or reducing the farmers' production, and the person who says that this won't work is likewise the same person who is asking this Congress to appropriate something near a hundred million dollars—I am not

quite sure that that is the figure, but it is many, many millions—to help the farmers grow more and more and more, just to stack it up here on top of an already existing surplus, to further reduce the farmers' prices.

That is what it does.

So I just want to say, in closing, that I do not care what the substance of the legislation that the Congress passes or that this committee reports out, excepting that I urge that we say to the farmers of America and the taxpayers of America, "We are going to try a new approach to this farm problem," I know it will take years.

You cannot do it in 1 day, you cannot do it in 1 year, and you cannot do it in 2 years.

I would say that you would not reach the ultimate on this possibly for 10 years, but I would say that the situation would get better each day and each year.

In fact, I think your farm situation would get better the very day the Congress passes this sort of legislation, and the President signs it.

My best judgment is the psychological effect on the American people, on business in America, would be exceptionally good.

I cannot possibly see anything against it, except that old resistance that we always confront, that I have confronted all my life in business and that is that we do not like to make changes and that it just cannot be done.

Well, I want to say that I think it can be done. But even if it cannot be done and to the extent that I think it can, it still is very, very worthwhile legislation, and ought to be passed by this Congress, and it ought to be passed this session of Congress, and we ought to get going on this sort of a thing.

I do not know that I have any further remarks to make. I am filing this statement. I have talked on this subject repeatedly for a number of years. Maybe there are some questions you would like to ask me.

If there are I would be very happy to try to answer them.

The CHAIRMAN (presiding). Senator Capehart, this committee has considered in the past, as you know, measures somewhat similar to what is now being proposed, maybe not in as large a measure. I remember well the late Senator Bilbo took the same position that you are now taking, that we ought to provide some ways and means of getting rid of surpluses, and because the committee thought his ideas were well taken, we provided funds to establish four huge laboratories in the country, in the hope that these laboratories would undertake to find ways and means of utilizing our surpluses.

It has not worked yet. We are still waiting, and I am just wondering if the same thing may not happen even if we enlarge the program as you propose.

Senator CAPEHART. May I answer that, Mr. Chairman? You are a hundred percent right. I have repeatedly said that. I said that in my statement, we have four laboratories, I believe they were set up in 1947, I believe it was, 1946 or 1947, I think the most amount of money they have ever had in any one year is something like 11 or 12 million dollars.

Now that is in comparison to the amount of money that private industry spends for research to find synthetic products so they won't have to buy farm products, such as peanuts; 10 or 12 million dollars for research for the American farmer to find new uses for his farm

products, new things to grow, and new markets in comparison to private industry which spends billions and billions of dollars.

I will not mention the name, but I know of one company last year that spent around $50 million to try to find synthetic products and I am not against them for trying to do it, I am not criticizing them for trying to do it at all. That is the American way.

But 10 or 12 million dollars for 6 million farmers, the biggest business in America, is just not sufficient money.

I think the trouble, our weakness, if I may say this, Mr. Chairman, up to date, has been that we have not hit this matter as hard as we should, with enough men, with enough money, with enough pilot plants, and with enough determination that we are going to solve the farm problem by finding new uses and new markets and I have no criticism of anybody, no criticism of what has been done.

I am just saying, for the 6 million farmers that is 10 or 12 million dollars, and that is all the money that has been appropriated to find new uses and new markets.

We appropriated nearly a hundred million dollars but that has been to show the farmer how to grow more. That has been to find out how to grow more, to kill the bugs, to kill the insects and a hundred other good purposes, but we are just not hitting it hard enough.

It would be like any other manufacturer that would spend too little to do the research and I think we have been doing too little.

The CHAIRMAN. What efforts have you made to encourage the present Secretary, Mr. Benson, to ask for more money for the purposes you are now asking about?

I am sure if he came before this committee, or the Appropriations Committee of which I am a member, asked for $50 million and could show that it could or would be wisely used, I am sure he could get it.

Senator CAPEHART. I think I must admit and must say that the present Secretary of Agriculture has been wrong in his attitude.

I think he should have been asking for a hundred million dollars. I think he should have supported this legislation wholeheartedly before, and I think he should do it today.

I am not his keeper, I am not his close adviser, but if he has not done as much as he should in respect to this sort of proposal then I say he is wrong, and I do not think that is any excuse for us here in the Congress not to do the thing we know is right and which should be done simply because the Department of Agriculture, or Mr. Benson, has failed to see the light and that is what I call it, is the light.

The CHAIRMAN. Of course you realize that irrespective of what we do with this bill, if it does not meet with the approval of Mr. Benson the chances are that he would advise the President to veto the legislation.

Senator CAPEHART. I do not believe he would. But then he might do it. I do not know. That is still my opinion, he would be wrong, and it still, I think, is no excuse for us in the Congress here not doing the things that we ought to do.

I am hopeful, in spite of the attitude they have taken over there that this Congress will pass this legislation, and will say to the administration "We want you to do this,"—rather than spending 4 or 5 billion dollars a year to try to handle the surplus situation in America—"We want you to spend whatever can reasonably be spent in a year, and we want you to build more laboratories, more pilot plants, we want you to hire more people."

One of the things they will tell you, people will tell you, is that you do not have enough scientists, do not have enough engineers, you do not have enough people who understand this problem.

Well, if they are right about that, I do not think they are, but if they are right about that, then we need this legislation more than ever because all three bills call for scholarships and training people in this art, and if it is true that we do not have sufficient people to do the necessary research, then we need this legislation more than ever, and if not this legislation, we need some other legislation to start teaching the boys and girls of the United States to practice this particular art and get into this kind of business, because as time goes on here now, we are going to have to have more uses for farm products in industry.

I can remember, you are older than I am and I am not going to tell you how old I am, when in Indiana we only used soybeans for hay purposes and made hay out of it.

Today it is one of our cash crops. There is an example of what might be done. I can remember, and there are older men than I am, when we had no tractors and we did all of our farm work with mules and horses and at that time it took the production of nearly 80 million acres of land to feed the horses and mules.

Today we farmers are throwing that production of the 80 million acres on to the market and we are buying our power in the form of gasoline and diesel oil and I am not complaining about it, I am glad we are, but there is an example right there of one of the reasons for our surplus.

We used to consume the production of 80 million acres in our power on the farm. Today we buy our power. I could go on and on and on here with reasons why we must find new uses for farm products in industry, and new things to grow.

On my farm, I grow primarily corn, soybeans, wheat and cattle and hogs but I would just as soon grow something else if I could make money on it and there may be many things that I could grow that would be profitable.

I will make the statement today that in 25 years or more we will be, I will say 50 years from now, we will be forced to grow our paper on the farm every year, because we are going to run out of pulpwood in the United States and you will be growing paper on the farm.

You will be growing fibers on the farm that will be hauled in with which to make paper. What are we waiting for when we have this terrific farm problem that runs into billions and billions of dollars, trying to solve it by reducing the farmer's production?

Why do we not at least—all of us—get behind this, including the Secretary of Agriculture, if you please, Mr. Chairman, and everybody else, and say we are at least going to try a new method. We may fail on it, but I do not think we will, and I know one thing, that it is the only answer to the problem because you never helped a man by pushing him down and that is what our farm problems are.

Senator JOHNSTON. You have read the reports?

Senator CAPEHART. I have not read the reports.

Senator JOHNSTON. I notice he states the Department favors the objectives of S. 3697 but opposes its enactment.

It goes on into detail concerning the setup, making certain recommendations for changes.

The similar phrases are used in the report to all of the bills. But they do not oppose the objective that you are driving at.

Senator CAPEHART. Well, I do not know what they mean by that. I don't think you do, either.

Senator JOHNSTON. I do not either.

Senator CAPEHART. What we are trying to do, what we are advocating, is that we go faster, that we push harder, that we do what private industry does, that we find the solution to the problem.

I remember we went along here for years and years in the rubber industry perfecting synthetic rubber, but then they put it on the shelf. Then the war came along and we could not get natural rubber and we had to get synthetic rubber.

What did we do? This Congress appropriated, I believe it was, $600 million or $800 million; called Mr. Jeffers in here, president of the Union Pacific Railroad, and said "We want you to build pilot plants, build production plants, finish the engineering and research on synthetic rubber and we want you to be in a position in"—I think it was—"either 2 or 3 years, to supply all the needs of the United States, all the rubber needs of the United States with synthetic rubber," and he did it, as you well know.

You can do the same thing here if you will put the zip behind it, if you will put the money behind it, if you will put the research behind it, and if you will put the will behind it and if you want to do it.

If the Department of Agriculture does not want to do it and you have got people over there who do not want to do it and say they are in favor of the objectives but, are still opposed to this legislation then you are not going to get these things done without specific legislation.

The CHAIRMAN. Senator, I have not had a chance to read or study your bill, or all of the bills before us; but, as I recall, all bills take research out of the Department of Agriculture.

It has to be handled more or less independently, isn't that right?

Senator CAPEHART. Yes; I think that is correct.

The CHAIRMAN. Probably the reason for the opposition is that apparently no bureaucrat here on the Washington level likes to lose anything.

He just holds on to what he has and wants more.

Now that may be the trouble.

Senator CAPEHART. I think the reason that all three bills do that is the reason that the Department of Agriculture, over the past years, could have recommended and done this job had they wanted to do it, and the very fact they have not done it is I think the reason why the three bills say we had better give it to somebody else to do.

Now, personally, I do not care whether it is a new agency or the Department of Agriculture does it, so long as it is done, and the only reason why I recommended that it be made a separate agency is to get more or less the same setup that we had on synthetic rubber under the Defense Rubber Act because you have got one man thinking about this problem 24 hours a day.

The Secretary of Agriculture could do this, yes, but he has got a thousand and one things to do.

This job is big enough and it ought to have one man as big as the Secretary of Agriculture, on a par with the Secretary of Agriculture, spending 24 hours a day thinking about it.

What could be more important in the United States than this problem, and as it is now, it simply is handled as a side line with the

Department of Agriculture, and that is not any criticism of them because they have got a thousand and one other things to do and there are only 24 hours a day, and a man can only do so much.

But this ought to be, in my opinion, a separate organization, but it does not need to be.

I do not care how it is done as long as we get busy.

The CHAIRMAN. Under our basic laws, I am convinced that if the Department of Agriculture had the desire to do what this bill proposes they could do it. All they need do is come in and make a case before the Appropriations Committee and they can get the money. You will agree to that?

Senator CAPEHART. I agree to that, Mr. Chairman, and I always have, and I have always said there is not anything new about this idea. The only newness in the idea of all three bills, Senator Johnston's, Senator Curtis', and my own, and of the recommendations of the Commission, the only newness is that we get busy, that we do this quick, and that we hit it hard and we do it now.

That is the only newness in the legislation, and evidently the Congress intended that something be done along the lines that we are commending here in this legislation, these three bills or we would not have set up the Commission which did an excellent job of studying the problem for a year and spent a hundred thousand dollars.

I do not understand the Department of Agriculture's position here, when the Congress spent a hundred thousand dollars studying the problem and after studying it making recommendations which in substance are what these three bills call for.

The CHAIRMAN. Thank you, Senator Capehart.

Senator JOHNSTON. I notice right along the same line you were speaking about the Department of Agriculture, next to the last paragraph in the letter in reference to S. 3697, you have this to say:

> The bill contains certain authorities that are not now available to the Department of Agriculture but which we believe are necessary in agricultural research, if it is to produce the expected results.

Senator CAPEHART. Yes.

Senator JOHNSTON. Yes. They show there that something must be done in order for bringing new results.

The CHAIRMAN. Thank you, Senator Capehart.

Senator SYMINGTON. Mr. Chairman, I would like to ask a couple of questions.

Senator, I am very much impressed with your statement about rubber and Jeffers and the farm problem.

As a matter of interest, when we first started making synthetic rubber it was very poor rubber and much more expensive than natural rubber. Then it got to be a better rubber than natural rubber but still more expensive. Now it is better, and less expensive than natural rubber. This evolution has been very good for the United States. What would be the position of the man who would be in charge?

Would he be a director reporting directly to the President?

Senator CAPEHART. If I had the hundred-percent responsibility and wanted to get this job done and get it done in a hurry at the least expense, I think it ought to be headed by a man who is on a par with your Cabinet officers, using the Department of Agriculture as the

housekeepers, so that he can bump heads together and get this job done and done in a hurry.

The reason I say that is because there are two parts to this job: one, there is a job of perfecting the research and then after you do that, you have got to see that the private industry of America processes and manufactures it, and you have got to have someone there who can get it made because what we are trying to do here is to find new uses for farm products in industry and if you are just going to do the research and put it on the shelf over here as you know as a manufacturer, it is not going to do anybody any good, so you have got to perfect the research, perfect the products, and then you have got to get them on the market.

As I envision this department and this man he will not only push the research, perfect the products, find new uses for farm products in industry and new markets but then he will go out and see that they are put into use; see that manufacturers process them.

Senator SYMINGTON. I understand that.

As I remember it, Jeffers reported directly to the President.

Senator CAPEHART. He reported directly to the President, yes. It was a separate independent agency.

Senator SYMINGTON. And he may have had some relationship with Mr. Jesse Jones?

Senator CAPEHART. I am sure he did.

Senator SYMINGTON. Would your bill embrace giving that man that type and character of power?

Senator CAPEHART. Yes, my bill would give him that sort of authority.

Senator SYMINGTON. He would report to the President?

Senator CAPEHART. My bill likewise has all the work done by the Department of Agriculture.

Senator SYMINGTON. One other thought, Senator. About 25 years ago, I was in on this question of southern pine for newspapers. The chemical foundations went into it. However, it did not work out as well as they thought it would.

Lately there has been a lot of thought concentrated on the utilization of corn, primarily in alcohol.

This would be a broad agency which would not just concentrate on 1 or 2 particular items that might help a particular district or community or area, would it?

Senator CAPEHART. No; every conceivable use that could be found for the products that we are now growing on the farm, to be used in industry, and then to find new things for the farmer to grow.

We have several million species of weeds throughout the world. Who knows but what many of them could be grown on our farms successfully and profitably, could be used for many purposes?

You will find in my statement and the statement of these other gentlemen the many, many uses that could be put to farm products.

Senator SYMINGTON. What you envisage therefore is a director of an agency who would report directly to the President of the United States, and be financed independently of the Department of Agriculture, is that correct?

Senator CAPEHART. What it really amounts to—you were not here when I said that we spent hundreds of millions within the last 100

years teaching the farmer to grow more, the Department of Agriculture, our great universities, and private industries.

We spent hundreds of millions and millions showing him how to grow more.

I want to set up a department that will find new markets for the farmer, new uses for his products because what good does it do to teach the farmer how to grow more now when there is no place to sell it?

Senator SYMINGTON. I have no further questions, Mr. Chairman. That is all.

Senator CAPEHART. That is all. Just a new department really to sell what the farmer produces and to show him how to find markets for new things that he is not now growing or new uses for that which he is now growing.

The CHAIRMAN. Thank you, Senator Capehart.

Senator Curtis?

STATEMENT OF HON. CARL T. CURTIS, A UNITED STATES SENATOR FROM THE STATE OF NEBRASKA

Senator CURTIS. Mr. Chairman, I have mineographed copies of my statement. Have they been distributed, Mr. Clerk?

Mr. Chairman, to save time, I am going to read just a very small part of this, about the first page and a half, and then I will skip to just a few sentences in there, because you have some individuals who should be heard today.

Mr. Chairman, may I express my gratitude to this committee for holding this hearing. A great many Senators and Representatives have expressed their interest in the development of a program to promote industrial uses of agricultural surpluses.

Many of them have introduced bills or joined in the introduction of bills.

I wish to particularly commend Senator Capehart, of Indiana, for his work in this endeavor. He has long been interested in it and given it much attention.

The bill introduced by a member of this committee, the distinguished Senator from South Carolina, Mr. Johnston, varies only a little from the measure that I have introduced, S. 2306. The passage of the Johnston bill would be most acceptable to me.

Mr. Chairman, the Senators who have introduced or cosponsored a proposal relating to the general subject of the promotion of the industrial uses of agricultural surpluses include:

Senators George D. Aiken, Gordon Allott, Frank A. Barrett, Glenn J. Beall, John W. Bricker, Styles Bridges, John M. Butler, Homer E. Capehart, Frank Carlson, Clifford P. Case, Francis Case, Dennis Chavez, Carl T. Curtis, Everett Dirksen, James Eastland, Ralph Flanders, J. W. Fulbright, Barry Goldwater, Bourke Hickenlooper, Roman L. Hruska, Jacob K. Javits, William E. Jenner, Olin D. Johnston, Estes Kefauver, Thomas H. Kuchel, William Langer, Frank J. Lausche, George W. Malone, Edward Martin, Thomas E. Martin, Thruston B. Morton, Karl E. Mundt, Frederick G. Payne, Charles E. Potter, William A. Purtell, Andrew F. Schoeppel, H. Alexander Smith, Margaret Chase Smith, John Stennis, Edward J. Thye, Alexander Wiley, and Milton R. Young.

I trust I have not missed anyone. If I have the oversight is certainly not intentional. In addition, a large number of the Members of the House of Representatives have introduced bills or have taken some active part in promoting this program.

Mr. Chairman, I have no pride of authorship so that I am speaking for the program generally. I am grateful to everyone who has advanced legislation dealing with the program for industrial uses of farm surpluses.

It is my hope that this committee can, with the help of interested Members of Congress, and the splendid outside help that is available, perfect a measure and recommend its passage to the Senate.

Mr. Chairman, at this time I want to pay special tribute to the bipartisan Commission on Industrial Uses of Farm Products. They have done an outstanding job. I have not only read their report, but substantially every bit of material prepared by their task forces.

These men have rendered an unselfish public service. Most of them were able to serve without even collecting their expenses.

They did not spend the $100,000 appropriated, a substantial portion of it was returned to the Treasury.

It is my understanding that 18 task groups were formed and that approximately 188 of the country's leaders in agriculture, industry, and science assisted this commission.

The Chairman of that Commission was my fellow Nebraskan, Mr. J. Leroy Welsh, who for more than a score of years has given unselfishly of his time toward this objective.

I might say the first committee hearing on this subject in which Mr. Welsh participated and assisted me was back in 1945, relating to the import then of natural rubber and the preservation of our synthetic rubber program which at that time was made out of agricultural products.

He was assisted by four distinguished men on the Commission. They were: Karl D. Butler, Charles R. Sayre, George H. Coppers, and Frank J. Welch.

Mr. Wheeler McMillen of the Farm Journal likewise has been interested in farm chemurgy for many years and has rendered valuable service as Executive Director of the Commission. Dr. G. E. Hilbert of the Department of Agriculture was of great assistance too.

The Welch Commission has charted the way for a new day in agriculture. They have advocated a program which in my opinion will be of great benefit to agriculture in that it will lessen the cost of our agricultural program.

I believe it can be carried out so that it is fair to every segment of our economy.

I know of no one who contends that our present farm program is satisfactory either to farmers, taxpayers, or to the Government. Both major political parties have wrestled with this problem for a number of years. The programs sponsored by the Government in the past have been put forth with good intentions. Many of the things that have been done have been of great temporary assistance to farmers, yet the problem remains far from solution.

The problems we now face and those the Government faces would have become this acute much earlier if it had not been for the intervention of two wars. In spite of all of the years of efforts put forth and the spending of billions of dollars we are still plagued by surpluses.

These surpluses hang like a cloud over the normal markets and prevent a rise in prices.

At the same time they are a heavy financial burden upon the Treasury of the United States. A reduction in acreage has not resulted in a reduction of surpluses. Many well-qualified people believe that we have not yet scratched the surface in the matter of productivity. We have reduced and reduced the acres which a farmer may plant in order to participate in the price-support program. The individual farmers are not to blame for the situation. If they are to stay in business and make a go of things they must produce all they can.

As usual when we compel a farmer to reduce and reduce drastically, the production of that crop for which his land is best suited, he must find something else to plant. We sometimes go around in circles. We reduce the corn acreage in our area, merely to find that the producer of another commodity who has had his acres reduced turns to corn.

We may find that a corn farmer, because he cannot produce enough corn, avails himself of the opportunity to raise the minimum number of acres of wheat. Therefore, he plants 15 acres of wheat to the detriment of the wheat farmers in an area where the land is primarily suited for wheat. Restrictions, reductions, regulations, and penalties rather than solve our problems merely confound them.

We must turn our attention to new markets. What are those new markets? Great and commendable efforts are being made to increase our exports of agricultural products. This is proving to be very costly. We are subsidizing, for instance, the export of wheat to the extent of about 75 cents or 80 cents per bushel.

But the real problem in reference to agriculture is that the world is producing more of its own food. Many countries that were, a few years ago, deficit food areas now are plagued with a surplus.

The greatest market we can find anyplace for agricultural products is right here at home. The greatest new market we can find is a market in industry. We are living in an industrial age. The American people are using more gadgets, more materials, and equipment of all kinds than ever before, and that use is increasing daily.

Many of these industrial uses can be supplied from raw materials produced on the land. For more than a quarter of a century many groups and individuals have advocated such a program. It has often been referred to as farm chemurgy, but those efforts have not gotten very far.

In 1956, an amendment to the agricultural bill was adopted which called upon the President to appoint a five-man Commission to recommend ways to increase the industrial uses of our agricultural products. The Commission has done a good job. The Commission called in 188 of the country's leaders in agriculture, industry, and science. Eighteen task groups were formed and they have brought in a report charting a course to reach this objective.

The bills before the committee were introduced to carry out the recommendations of this bipartisan Commission.

This program falls in three parts. The program recommended goes far beyond research.

In the first place, it calls for a broad program of scientific research to find new uses for farm crops.

Secondly, it calls for a program of trial commercialization and pilot testing. Research merely for the shelf does not provide the answer. We must have this trial commercial situation and pilot testing. Thirdly, it seeks a program of limited subsidies on a test pilot basis to both farmers and industry to get the program started.

None of us will deny the value of research. Most of the material things that we use and enjoy from day to day are the products of research. The great advances in medicine, that have extended human life, are a result of scientific research. The atom was split and a profound program of peacetime uses of atomic energy awaits us, all because of research.

Oh yes, there has been research in the field of agriculture. But, practically all of this research has been directed toward how we can produce more and we have neglected the research on finding new uses for that which we can produce.

It is because of research that we now produce 100 bushels of corn where we used to produce 25.

All through these years, however, the talent, the brains, the laboratories, and the money have not been applied to finding new uses for the things we produce on the farm.

As the Welsh Commission points out, industry is currently investing at least $3 billion a year, 3 percent of gross sales, in research. The result is obvious in a constant flood of new and improved products—fabrics, plastics, building materials, surface coatings, detergents, chemicals, and many others.

Many of these so-called miracle products of modern research have provided the foundation for vast new industries and the stimulus for new consumer demands. Most of the products are based on nonagricultural raw materials—particularly chemicals derived from petroleum—which are chemically taken apart and rebuilt—synthesized—in new forms. This search by industry is continuous, systematic, and intensive.

By contrast, agriculture spends not over $375 million on research—about 1 percent of gross sales, and most of this goes to improve and increase production. Federal and State governments spend $190 million of the total, of which no more than $18 million goes for utilization research.

In other words, about one-twentieth of 1 percent of the gross sales of agriculture has been used on research to find new uses for agricultural products.

The result has been that we not have not found new markets we have lost many of the markets agriculture formerly had. Again, quoting the Welsh report, synthetics and petroleum chemicals have increasingly moved into the industrial markets for vegetable oils.

In the last 20 years, for example, domestic use of paint, varnish, et cetera, increased about 100 percent in the rapidly expanding United States economy. Use of linseed, or other drying oils, increased only about 25 percent. Synthetics took their place. If linseed oil were used in paints today at the same rate as in the early 1930's, the United States would need a million more acres of flax. Per gallon of paint, the use of drying oils has dropped more than 40 percent in the last 20 years or so as they were progressively replaced by synthetic products. Tung oil is affected by the same trend, and that is important to a very great segment of our agricultural economy.

Now in writing legislation on this subject care should be taken that the use of one agricultural commodity is not expanded at the expense of another agricultural commodity.

I am sure the board, which is to be created, will likewise follow such a policy. All segments of American agriculture must work together and receive equal treatment.

So in recent years agriculture has been researched out of a good part of its natural markets.

Nearly half of the market for natural fibers—cotton, wool, flax, silk—has been taken over by synthetic fibers. Two out of three pairs of shoes are now made partly or wholly of leather substitutes. Two-thirds of the soap has been replaced by detergents,which do not use natural fats. In fact, in the last 10 years the use of detergents per person increased from 1 pound a year to 15 pounds while the use of soap decreased from 23 pounds to 8 pounds a year.

The CHAIRMAN. All of that came about by research, did it not, Senator?

Senator CURTIS. Research other than agricultural and it's made from nonagricultural products.

Now in my paper I discuss rubber, alcohol, motor fuels, and plastics, but it does not end there and I approach this thing realistically, not by Government forcing the use of something, we cannot do that in our free economy, but to get the research so that we can find the most economical way for our private enterprise to operate.

One of the jobs of this research and trial commercialization is to regain the markets we have already lost, but there are many, many opportunities in addition to that.

At the present time we are using more synthetic rubber than natural rubber. It is of better quality. It has been improved because of research. The research has been done by the petroleum industries and they are making the rubber. It is estimated that the consumption of synthetic rubber will increase by 50 percent in the next 5 years.

Were the American farmers allowed to have that increase only and were that rubber made from alcohol provided from farm products, it would require 200 million bushels of grain.

It is contemplated that, if this program is initiated, the Board would reactivate the Government-owned alcohol plant at Omaha and the synthetic rubber plant near Louisville, Ky. The Johnston bill specifically so provides. These plants would work jointly in the production of alcohol, butadiene, and rubber. They would fit into the program of research and trial commercialization in order to develop the larger program.

A former distinguished Nebraskan, William Jeffers, as the rubber czar in World War II, made a large portion of the Nation's rubber from alcohol made from grain. It can be done again. When Mr. Jeffers started, the cost of synthetic rubber, per pound, was exceedingly high. That cost was gradually lowered thoughout the program. The lowering of costs is the important element in a trial commercialization program.

It has long been my hope that we could use alcohol produced from grain as a part of our motor fuel. Farmers buy a lot of gasoline and tractor fuel. Certainly they should be allowed to produce their own fuel. The number of cars in the country is constantly increasing and

likewise the motor-fuel market is increasing. European countries have blended alcohol into their gasoline up to 25 percent. Were we to blend alcohol into our gasoline to the extent of 10 percent, it would require more than a billion bushels of grain. In other words, that one use alone could probably solve the grain-surplus problem.

However, we face a very definite obstacle in regard to this. It is an economic fact that gasoline can be produced cheaper than alcohol. Consequently, no one selling gasoline is going to turn to a blended alcohol. In peacetime, under our free American system, we cannot compel them to do so by law.

However, I am thoroughly convinced that a broad program of research will lower the cost of producing alcohol from farm products. At the present time when we make alcohol out of farm products we have a protein residue that is a very valuable food for animals. However, with improved methods brought about by research and trial commercialization, it is believed that the alcohol can be extracted and the protein residue will be a fine human food. Its value will then be many times greater than its value for livestock food. The alcohol will then become more or less a byproduct and it can be sold at a price that it will compete with gasoline for a part of this motor-fuel market.

So, while a portion of the motor-fuel market is not ours at this time, it is not an impossibility from the standpoint of the long-range accomplishments.

A number of leaders in the petroleum industry are not adverse to these efforts. They realize that the farmers are purchasers of their products. They realize that farm prosperity means a great deal to the prosperity of our country. Furthermore, these same companies will be selling the motor fuel at all the filling stations in the country regardless of the components of that fuel. They are not going to lose the business.

Incidentally, it is the objective of the legislation and the Welsh Commission report that the Government enter into the field of research, trial commercialization, and pilot testing with limited subsidies, but that the results be turned over to private enterprise. We do not advocate a program of Government-owned plants and Government manufacturing of products from the farm or from any other source.

Our surpluses are primarily starches. From starch we make alcohol and from alcohol we can make rubber, we can make plastics, we can make a thousand and one things that are now being made from other materials.

We are not limited by any means to motor fuel and rubber and like products. There are literally hundreds of possibilities of making industrial uses of agricultural products. These include solvents, surface coatings, plastics, chemicals, fibers, films, explosives, adhesives, lubricants, insecticides, drilling muds, paints, varnishes, and even paving materials.

In our gigantic program engineers have brought forth some sound ideas relating to the use of our starches and our surpluses in our starches and in fibers.

For instance, the Welsh Commission report says, as an example, about 35 percent of the corn processed by wet milling now goes to nonfood uses. The industry would like to expand this fifteenfold.

The largest new outlets it envisages are for the use of starch in metallurgy, in insecticides, in defoliants, and in paper. These 3 uses alone might take up to 410 million bushels of corn annually.

Our country produces great quantities of sugar; we could produce a lot more. Here is what the Welsh report says about the industrial possibilities in regard to sugar produced in your State, Mr. Chairman, and mine:

> The sugar industry is confident that these industrial uses will be developed, to the extent perhaps of utilizing an extra million tons of sugar by 1965 and 2 million tons by 1975. This would add more than 10 percent to the projected 1965 demand and more than 16 percent to that projected for 1975. Sugar is an inexpensive, exceptionally pure, and, chemically, very reactive material adaptable for many large-scale industrial applications. Present industrial use is small, but a dozen years of research have turned up some highly promising leads.

We have known for a long time that sugar is the finest food for quick energy, and for industrial purposes it has never been scratched, and we can increase our sugar acreage tremendously by following through on this.

I want to stress that we need the research but we also need the trial commercialization, the pilot testing, and limited subsidies.

For instance, here is an idea on the shelf. Are our farmers going to plant a new crop just hoping somebody will build a factory and try it out, or will somebody else build a factory hoping that farmers would plant something new which can be utilized?

This is where your threefold program comes in.

Perhaps the forage crops we produce have the highest value of any crops since they furnish over half the feed for livestock. Yet it is likely that far greater values lie locked up in those crops, particularly the legumes, than those which have been exploited. At the present time, we extract some chlorophyll and some xanthophyll from legumes.

But, the Welsh Commission reports that the 55 million tons of legumes produced annually in the United States also contain some things that we have never developed. These include a billion dollars worth of protein, carotene worth 2¾ billion, vitamin E 2 billion, vitamin K 115 million, xanthophyll 12½ billion, and chlorophyll worth 19 billion.

Now, these figures may be a bit fantastic but it shows that these materials are in our legumes, are waiting there to be used and developed for medicinal and other nonfood uses.

I want to quote from the Welsh report in one other instance in reference to potatoes. Here is what it says:

> The potato industry is confident that a materially enlarged research and development program would so expand the market that surpluses would disappear and it might even be necessary to increase production.

I want to talk a little bit about the section on new plants.

The all-wise Creator put on this earth 250,000 plants. We have domesticated and used only 150 of them—not 150,000, but 150.

We have never taken the trouble to find out what the rest are for, and we are exhausting some of the things that do constitute a real soil bank or a bank in the bowels of the earth.

I discuss a number of these things and want to read one paragraph here.

We are short of paper in this country. The American people use more paper products than anyone could ever imagine. Not only is our population going up but the per capita consumption of paper increases. We use it for everything in our homes.

Our publishers sometimes get concerned about the shortage or the threat of a shortage of paper. The task group on new and special

crops points out that we can make not only paper but furniture and specialties from bamboo. They further point out that you can produce bamboo in the south from South Carolina to Texas and the coastal and Piedmont areas.

It will grow faster than the pine itself. This crop could be expanded for industrial purposes so that we could use a million acres of bamboo. This crop alone might solve the surplus problem facing cotton farmers.

We must remember always that what helps any segment of American agriculture helps all of American agriculture, and as a Nebraskan I am just as interested in the problems of the Cotton Belt as any other area.

This same task group made reference to a very fine productivity going on in Nebraska. I refer to the development and improvement of safflower. This crop did not amount to very much until 1946 when the results of research and development of the Nebraska Agricultural Experiment Station were made known. At the present time we raise about 100,000 acres of safflower, most of it in northern California and western Nebraska.

Safflower oil is now being sold to manufacturers of alkyd resins, enamels, varnishes, and high-quality paints. It is believed that with further development in research great possibilities may come from the safflower.

Throughout the years our cordage and rope, particularly the cordage for marine use, has been from abaca and sisal, which are imported products. The task group on new crops points out that sansevieria, a commonly used house plant, known as the snake plant, can be used for cordage and rope, and this promises a market of a possible hundred thousand acres.

Kenaf, the task force points out, can be used to make fiber for post office twine, carpet yarn, camouflage, burlap, and other articles normally made of jute, which is imported. They point out that this new industrial use, when fully developed, could require the production of 200,000 acres.

Another crop mentioned by this same task group was simmondisa, from which we can produce a wax, to be used for fine waxing and polishing. It would be noncompetitive because wax is now in demand in industry. This had a possibility for a hundred and fifty thousand acres of new crops.

We use tannin in the leather industry. It is believed that we could use the production of a hundred thousand acres of canagrie to produce the tannin and it would be competitive in price with our imported tannins.

If a program of broad research and trial commercialization can be gotten under way, it is very likely that many of these things I have mentioned can be developed. It is also very likely that some of them may not prove to be practical.

At the same time, there will be many, many other uses to come out of such industrial research which none of us have ever thought about.

This is a long-range program. It will take time. It will not solve all of our problems. I am thoroughly convinced, however, that the avenue which has been neglected so long is the one we must now pursue and it is new uses for the crops we produce. The program of restrictions and limitations is not working.

The objective we seek is full production for American agriculture. May the time soon come when the American farmer can manage his own land, plant all of his acres, and sell his products at a fair price.

I am not unaware that industry will be anxious to buy the raw products of our farm at the lowest possible competitive price. Therefore, there will be instances where additional uses of a product do not necessarily bring the price level up to the point where it should be.

I point out, however, that if we have a market for the crops we produce and can get rid of surpluses, price supports, when and if necessary, become much simpler.

They are no longer a costly burden on the part of the taxpayers.

People who have not gone into this have had a fear it will hurt their particular industry. What we seek here is to do for farmers what they can do for themselves by having equivalent research and pilot testing, whereas individual farm operators cannot set aside for research to keep up with industry.

Whatever we do, we want to find the most feasible and economic use for farm products and let private enterprise take over from there.

Mr. Chairman, the distinguished men who have helped with this and who are here today must be heard. I have a long list here of those who want to appear.

I will submit the list to the reporter, rather than read it, together with the required number of copies of their statements. Mr. Chairman, I offer the statements at this time and the list of people who gave their time, paid their own expenses, and without taking any more time I want to yield the floor unless there are questions.

(The list and statements are as follows:)

Representative Phil Weaver of Nebraska.

John J. Hamel, Jr., executive director, National Renderers Association, Inc., 30 North La Salle Street, Chicago, Ill., member of Oilseeds and Animal Fats Task Force of Commission.

Marshall E. Leahy, executive vice president, Farmers' Rice Growers Cooperative, 1005 Russ Building, San Francisco, Calif., Cochairman, Rice Task Group of Commission.

Dr. R. D. Lewis, director, Texas Agricultural Experiment Station, College Station, Tex., Chairman, New and Special Crops Task Group of Commission.

A. E. Thorpe, executive vice president, Dried Fruit Association of California, World Trade Center, San Francisco, Calif., member, Fruits, Vegetables, and Tree Nuts Task Group of Commission.

Marshall Ballard, Jr., president, American Tung Oil Association, Lumberton, Miss., member, Oilseeds and Animal Fats Task Group of Commission.

V. Conquest, vice president, research division, Armour & Co., Union Stock Yards, Chicago, Ill., member, Hides, Skins, and Animal Byproducts Task Group of Commission.

Merle A. Delph, president, M. A. Delph Co., Inc., 517 West Ray Street, Indianapolis, Ind., member, Hides, Skins, and Animal Byproducts Task Group of Commission.

National Council of Farmer Cooperatives, 744 Jackson Place NW., Washington, D. C.

R. B. Taylor, administrator, Oregon Wheat Commission, 305 Southwest 10th Street, Pendleton, Oreg., member, Industrial Uses for Grain (Other than Alcohol) Task Group of Commission.

George E. Johnson, chief engineer and manager, steam generating division, Central Nebraska Public Power & Irrigation District, Hastings, Nebr., civil and electrical engineer; former State engineer for the State of Nebraska; president, and general manager of Farm Crops Processing Co., operating the Omaha alcohol plant during World War II.

Marvin W. Swaim, president, Alton Box Board Co., Alton, Ill., member, Crop Residues Task Group of Commission.

K. Starr Chester, technical adviser, paperboard division, Alton Box Board Co., Alton, Ill., consultant to Commission.

R. H. Richards, vice president, International Shoe Co., 1509 Washington Avenue, St. Louis, Mo., Chairman, Hides, Skins, and Animal Byproducts Task Group of Commission.

Willard C. Lighter, executive vice president, the Glidden Co., 900 Union Commerce Building, Cleveland, Ohio, member, Oilseeds and Animal Fats Task Group of Commission.
Donald F. Othmer, professor of chemical engineering, Polytechnic Institute of Brooklyn, 99 Livingston Street, Brooklyn, N. Y.
Donald M. Counihan, on behalf of the American Corn Millers' Federation.

STATEMENT OF THE HONORABLE PHIL WEAVER, A REPRESENTATIVE IN CONGRESS FROM THE FIRST CONGRESSIONAL DISTRICT OF NEBRASKA

Mr. Chairman and gentlemen of the committee, thank you for the opportunity to appear briefly before your committee today in behalf of S. 2306 and other bills which would provide for the increased use of agricultural products for industrial purposes.

As a Representative in Congress from Nebraska, one of our great agricultural States, I am vitally interested in the enactment of this legislation. Members of our own congressional delegation in the House and Senate have consistently endorsed and supported similar measures which seek many of the objectives of this bill. During this session I introduced H. R. 8428, which would provide for the increased use of agricultural products for industrial purposes. I am pleased to add my voice to the supporters of this legislation.

Mr. Chairman, we can and we must increase our research and development work on industrial uses of farm products. Out population is expanding rapidly. But there is general agreement, I believe, that markets for food and fiber for personal consumption are not likely to expand as rapidly as farm output will in the next 5 or 10 years.

At the present time only 7 out of every 100 acres of cultivated land produce crops for industrial (nonfood and nonfeed) purposes. We should increase this acreage by at least 50 percent. New industrial uses are not immediately at hand. There is strong competition among all the raw materials utilized in industrial production. Increased industrial use of farm products will only occur if through research and development programs it can be demonstrated that farm products are the most economical and the most satisfactory raw materials for specific industrial uses.

When we look at agricultural research budgets in comparison with industrial research budgets we can easily find an explanation for the present small use of farm products in industry. Agricultural research expenditures amount to but little more than one-half of 1 percent of farm product sales. Roughly half of this is privately financed and half is financed by Federal and State Governments. In contrast manufacturing industries invest about 3 percent of their gross sales in research. Some of the chemical industries invest as much as 4 to 7 percent of their sales income in research. They carry on research to create new products and to improve old products and manufacturing processes.

Is it any wonder that we have lost large markets for farm products to detergents, synthetic fibers, and plastics in recent years? A part of the answer to gaining new markets for farm products through industrial outlets involves finding and growing new crops which are better adapted for industrial uses.

May I point out, Mr. Chairman, that one of the promising new crops for Nebraska is a dry-climate thistle called safflower. This plant yields a high-quality oil which is adapted for use in a wide variety of industrial products in addition to being edible. Approximately 100,000 acres of this crop were grown in California and in western Nebraska in 1956. It is an excellent example of opportunities for expanded research which should pay big dividends to agriculture and to our entire economy. Further research is needed on breeding the safflower plant for earlier maturity and higher oil yields. The special properties of the oil also merit further investigation to discover additional industrial uses.

No adequate study has ever been made of all the plants that are known to have been used by ancient peoples. United States agronomists have spent most of their time developing improved strains of existing crops. Research on new plants could be expanded several fold without exhausting its possibilities.

But fully as important as developing new crops, there are exciting possibilities of developing new uses for our existing crops of wheat, corn, sorghum grains, and soybeans. The Commission on Increased Industrial Use of Agricultural Products, headed by an able and well-known Nebraskan, Roy Welsh, of Omaha, estimates that new outlets for the use of starch in metallurgy, in insecticides, and defoliants might take up to 400 million bushels of corn a year.

If an improved method for the separation of the protein fractions in wheat can be developed it will be possible to combine food and industrial utilization of wheat more effectively than is possible at present. These are only a few examples of the industrial use possibilities open to agriculture if research and development programs are expanded.

This is the time, Mr. Chairman, we should be giving serious thought to prompt and favorable action on this matter, and I certainly trust that your committee will expedite final consideration. Thank you.

STATEMENT OF JOHN J. HAMEL, JR., EXECUTIVE DIRECTOR, NATIONAL RENDERERS ASSOCIATION, INC., CHICAGO, ILL.

We are, of course, quite enthusiastic about the Federal Government undertaking a large research program in the field of industrial uses for agricultural products. Past experience has shown that such research will do much to develop better markets for our farm products and help utilize our farm resources to their fullest advantages.

It is particularly important, we believe, to develop ways of encouraging the use of farm products, as industrial raw materials as contrasted with just seeking new markets. In the past 20 years, the industrial market has moved drastically away from natural materials and agricultural sources. The development of stable industrial markets for agricultural products would, therefore, be of great benefit to both industry and the farm economy.

A particularly dramatic case in point is the animal fat surplus created largely through the shift of the detergent industry from fat-based soaps to synthetics. The fat producers have recognized that the development of markets for export and animal feed uses help to maintain the value of their products, but that the ultimate effort should be to seek use of fat as an industrial raw material thus replacing a lost industrial use.

Regarding bill S. 2306, we have several suggestions which we would like to make. We like the principle of organization outlined in the bill, and we are in hearty agreement with the emphasis placed on industry in the choice of the Board. We feel that there should be good representation by those who are familiar with or engaged in the manufacture of industrial products.

It appears that the statement regarding selection of the Board could be strengthened somewhat as the represented groups greatly overlap. The following is suggested: Three members of the Board shall represent industry and two shall represent agriculture. At least one of the industrial representatives shall be a scientist.

The method of financing this program also gives us some concern. It appears that a certain percentage of any revenue will be a sum which will vary greatly from time to time. A program such as this one should be continuous. Research is best carried out on a planned, long-range basis and research teams once organized must not lose their support periodically or the scientists will be lost to the program and they will be replaced with new men lacking the experience gained in the course of this program. We feel that a fixed sum appropriation would allow for a better planned and better executed program.

STATEMENT OF MARSHALL E. LEAHY, EXECUTIVE VICE PRESIDENT, FARMERS' RICE GROWERS COOPERATIVE, SAN FRANCISCO, CALIF.

My name is Marshall E. Leahy; I am executive vice president of Farmers' Rice Growers Cooperative of San Francisco, Calif. Our organization is a cooperative organization engaged in the production, processing, sale, and distribution of rice and rice products. Our membership consists of over 500 rice producers in California and our products are marketed in the continental United States, its Territories, and possessions, and in export principally in south Asian countries.

I am likewise chairman of the Rice Research and Marketing Advisory Committee functioning under the United States Department of Agriculture. Our committee has consistently urged that research go forward in attempting to develop new and increased industrial uses for rice. Some excellent work has been done by the Department, particularly in utilization, and other research is presently underway. There is still a great need for further effort in expanding and

implementing such work in the hope that uses may be developed for rice in order that the producers avoid further curtailments in production.

In order that the rice industry may survive the challenge from other commodities and from changes in eating habits, it is essential that a continuing research effort be pursued. Experience has proven that in order to be a sound program emphasis should be placed on basic research which will produce and develop new ways to increase the utilization of rice and rice products.

The rice industry feels that one of the essential projects that would impart revolutionized consumption of rice would be the development of what we term "convenience rice products," namely rice products that are easy for the housewife to prepare without loss of taste preference. Even a slightly increased per capita consumption of rice in the United States would eliminate the entire so-called rice surplus. It is a strange commentary that the average United States consumption of rice, particularly in the Northern States, is far below the world per capita consumption. With modern housekeeping techniques tending more and more toward mechanization, rice must in some manner keep pace so that the housewife can readily place upon the table attractive, colorful rice dishes with a minimum of cooking effort. Research is needed to develop ways and means of avoiding the lengthy cooking process that normally is employed in preparing rice.

Another major problem which has plagued the rice industry is the matter of utilizing rice hulls which accumulate in large quantity in connection with the milling process. Over the years there have been many studies made on the question of finding an outlet for rice hulls and some success in a limited way has been found. However, there is still a great need for some industrial use for the rice hull which now is not only a waste product but creates a disposal problem in connection with milling processes. The entire industry would be forever grateful to any research man who could develop some workable and sensible use for the hull which now represents a loss of about 20 percent of the weight in rice milling.

Other projects for many other uses could be mentioned but it is my belief that the foregoing are two major items in which industry is vitally interested.

Continued devotion to rice research which is basic will, in the opinion of most rice experts, give us an answer to one or both of these problems.

STATEMENT OF R. D. LEWIS, DIRECTOR, TEXAS AGRICULTURAL EXPERIMENT STATION, COLLEGE STATION, TEX.

A new or special crop is herein considered to be one not established in the United States or region thereof. While prime emphasis may now be given to new crops having potential uses in industry, consideration must also be directed to replacement crops for food and feed crops now in surplus and to strategic and other crop products now largely imported.

The term "new crops" has magic appeal to the uninitiated and to the public in general as an immediate solution to needs for diversification in farming, alternative sources of income, reduction of surpluses, and sources of new industrial products for an expanding economy. But let us above all get this straight—A new crop is neither a magic development nor a magic solution. It generally represents years of search, study, evaluation, adaption and culture, deliberate development and planned promotion.

In the United States, and elsewhere, relatively few species of plants are cultivated by man, if we exclude ornamentals. Hardly more than 150 species are cultivated by the farmers of the United States for food, fiber, and industrial purposes. In this large agricultural Nation only 80–90 species produce crops each valued annually at a million dollars or more.

Thus you see that from the 250,000 known species of higher plants in the world, economic use is made in the United States of an exceedingly small fraction. Again, the enthusiast says the opportunities are unlimited. To the realist, the fact that so few plants, excluding ornamentals, are utilized commercially introduces caution in expecting immediate spectacular finds in new crops.

However, it is likely that modern man with all his varying needs and his new knowledge and technology in biology, chemistry, physics, engineering, and economics could find more plants to develop into crops of significance in his life and activities. But, as with soybeans, first introduced into this country over 100 years ago, years of coordinated and expensive research, trial, education, and promotion will be required.

Rarely, if ever, will a new crop prove to be entirely noncompetitive with some other crop, product, or material otherwise obtained. Before a new crop can

advance successfully from the screening and evaluation stages to the status of commercial production, need and prospective competitive advantage of the products derived from it will necessarily have to be determined.

There should be especial interest in new crops, the products of which may compete with materials of mineral or petrochemical origins or with items having unreliable foreign sources. The development of a new crop, having a product superior propertywise or costwise to that from existing crops, may help to preserve or provide a market for agriculture, which otherwise would be taken over wholly or in part by nonagricultural materials.

MARKET OPPORTUNITIES FOR PLANT-DERIVED PRODUCTS

The successful establishment of a new crop having industrial values depends on marketing both primary and secondary products. Naturally, many new crops or their byproducts will have food or feed uses as well as providing industrial raw materials. In this era of rapidly changing needs for plant products, it would be shortsighted to consider only those new crops which can satisfy present industrial needs. New crops research and development should be directed at anticipating the future needs of both industry and agriculture.

The chemical and utilization specialists and consultants developed (in 1957) the following list of major industrial needs for products derived from plant sources. The list is not considered complete nor adequate in presenting potentials of industrial use.

1. Pulp and cordage fibers.
2. Gums and mucilages.
3. Proteins for industrial and feed uses.
4. Vegetable oils, for use in lubricants, plasticizers, resins, coating, etc.
5. Waxes.
6. Pharmaceuticals, potential acreages are relatively small.
7. Tanning agents.
8. Insecticides.
9. Antioxidants.
10. Films and fibers.
11. Soil conditioners.
12. New foods.
13. Seeds for new, special, and strategic crops.

FROM WHENCE COME NEW CROPS?

The basic materials for new crops may be found in the wild, anywhere on the earth, or under cultivation in other countries. Depending upon the source and the existing knowledge, different approaches in research and development are required to bring these materials into potential use, and to bring about the establishment of another species in our agriculture. The several stages and sources of plant materials for use and development may be classified as follows:

(*a*) *Plants with characteristics which suggest potentialities as crops in the United States*

1. *Wild plants not cultivated anywhere.*—This is by far the largest category of plants. It is also the category about which we know the least.

2. *Plants cultivated as crops in foreign countries but not in the United States.*—All of the major crops now under cultivation in the United States were adopted from this group.

(*b*) *Plants now under preliminary cultural investigation but not in commercial production in this country*

The immediate source of the plants of this group may be from the wild or by adoption from foreign agriculture.

(*c*) *New crops recently placed under commercial production but not yet firmly established in our agricultural economy*

Improvement by breeding, determining plant food requirements, insect and disease control, machinery development, utilization, and marketing problems are all subjects of research and development at this stage.

(*d*) *Crops firmly established in our agricultural economy*

At this stage new germplasm is sought through introduction for the purpose of supplying characters needed for the further improvement and adaptation of established crops.

Because of objective, specific needs, over 95 percent of the more than 7,000 plant introductions brought annually into this country in recent years, have been breeding stocks to be screened as possible sources of characters for improving existing crops. Strictly speaking, these are not new crops.

SIX ESSENTIAL STEPS IN EXPANDED RESEARCH AND DEVELOPMENT FOR NEW CROPS

Probably the most important contribution of the Task Group on New and Special Crops was the development (unanimously endorsed) of a six-step proposal for intensified research and development of new crops. Every member of the group was aware of the naive ways in which many enthusiasts propose new crops for industrial use as immediate solutions to agricultural problems. Consequently, the task group presented a logical succession of interrelated and complementary steps in research and development. These begin with a basic inventory of potential plant resources of the world and progress through exploration, introduction, evaluation, adaptation, culture, industrial characterization, and utilization, and establishment in the economy of the Nation. Let's look at these steps; to each of which is appended an estimate of additional funds initially needed annually for a reasonably adequate program.

I. Basic plant resources inventory

Although much has been published on the composition and uses of plants, this information is widely scattered in the literature of botany, chemistry, ethnology, pharmacology, and archeology. To date, there has been no objective attempt to assemble, digest, and organize this wealth of information and to make it readily available. Yet this information is the very basis for planning of objective botanical and chemical screening programs.

If this task is approached from the standpoint of end-use categories, drugs, oils, gums, etc., publications summarizing the existing information on each category could be released as soon as each subject is completed. The information assembled in such a bibliographic search should be codified and adapted to electronic sorting devices. New information could be added as it becomes available and the summary of knowledge kept current.

From these continuing summaries an intelligent program of plant exploration, collection, and evaluation can be developed to meet the needs of industry and agriculture.

It was estimated that $200,000 per year will be required to adequately support this area of research.

II. Plant exploration and botanical research

When specific needs of agriculture and industry are known and the most likely plant sources to fulfill these needs have been determined, then programs of exploration and procurement can be devised.

Of the more than 7,000 plant introductions which are now being made annually over 95 percent are of additional breeding stocks for improving existing crops. This is a necessary and valuable research effort and should be greatly expanded, but at the same time it reveals the comparatively small emphasis that has been given to the introduction and objective evaluation of entirely new crops for industrial usage.

The task group estimated that additional support of $200,000 per year for plant exploration and botanical research will be needed.

III. Research on adaptation, varietal improvement, cultural practices, and mechanized production

New crops cannot be transplanted simply from one environment to another. They must be fitted into the growing conditions to which they are naturally suited and then modified through breeding and cultural practices to improve quality and quantity, to resist diseases and other production hazards, and to extend the range of adaptation. Consequently widespread and intensive studies of the following types are required:

1. *Adaptation studies.*—New plant introductions must be field tested widely for general adaptation before more intensive efforts can be justified to develop superior varieties through breeding, or to improve cultural practices.

2. *Breeding improved varieties.*—Potential new crops can, almost without exception, be fitted to new environments by modifications through breeding. The combining into superior varieties of disease resistance, adaptation to general climatic conditions, and desirable agronomic characteristics to enhance productivity and quality can mean the difference between the success or failure of a potential new crop in the agricultural economy of a region.

3. *Cultural practices.*—Productivity of a new crop usually can be increased greatly through modification of cultural conditions, including rate, date, and method of planting; use of plant food; weed and pest control; and similar practices.

4. *Engineering research on production machines.*—Efforts to develop new crops must include attention to machines for planting, cultivating, harvesting, and such preliminary or field processing as may be required for efficient production and handling of the crop.

Industrial utilization of new plant-derived materials will, for the most part, be dependent upon the successful technical and economic establishment of the source plant as a crop.

The expansion of research activity in this area to a level commensurate with utilization research on new crops will require an additional budget of at least $1,500,000 per year.

IV. Supplying materials required for chemical and biological screening, analysis, and processing

There is considerable expense involved in the collecting or growing of plant materials needed to supply chemical and industrial screening and developmental research. This has been generally overlooked in appropriating or allocating funds.

A budget of $400,000 per year will be required to service these programs with the required plant materials.

V. Chemical and biological evaluation and processing studies

The usefulness of a plant as a crop, assuming production problems are or can be solved, depends upon: (1) its chemical makeup of major and minor constituents and byproducts suited for specific end uses, and (2) the possibility of its being profitably grown by the farmer and processed by industry.

The search for and identification of crops for industrial uses involve complex chemical, physical, and operational studies. These may be briefly outlined as:

1. *Chemical screening.*—The potential new crops should especially find uses and satisfy needs not presently served by established crops.

2. *Detailed chemical studies.*—As a result of chemical screening, certain plants will appear as particularly meriting more extensive chemical studies. Detailed investigations will then include: methods of recovery of constituents; their isolation in sufficient quantity and purity for investigation; characterization of constituents by properties, composition, and structure; and the reactions and reaction products of the constituents as compared with the original materials.

3. *Assessment of industrial end uses.*—As a result of detailed chemical study, information on the properties of selected plant constituents and their reaction products will be available. Evaluation of these should then be made. Will the product probably be useful for the purpose originally intended or sought? For other purposes? How would it compete with present materials? What are estimated future needs for the product?

4. *Byproducts.*—Byproducts obtainable from a plant in addition to the constituents of primary interest generally govern the economic feasibility of industrial production.

5. *Processing and pilot-plant studies.*—Successful completion of processing studies, demonstrating the effectiveness and economy of a process, carried at least through laboratory and pilot-plant stages, may induce industries to provide markets for the grower of the crop.

The task group recommended that utilization research, including chemical and biological screening studies, on new crops and potential new crops should be supported by an additional initial annual budget of $1,500,000.

VI. Determination of problems and possibilities of promising new crops

A potentially useful new crop may fail to become established through lack of adequate incentives to get it through the "awkward stage." Incentives are generally considered necessary to encourage early ventures into production, processing, and utilization; for supplying special equipment for harvesting or processing; and for assuring market outlets. The task group specifically mentioned crops which they considered to be in the awkward stage.

Some form of sponsorship of a potential new crop is generally required for prompt and effective coordination of production, marketing, processing and utilization of that crop and its industrial products. Incentives paralleling these now used in other natural resource industries may be considered. They include as possibilities rapid amortization, cost sharing, and contracts, along with support

prices (as in the National Foundation seed project) and payments for replacing acreages of surplus crops.

Developmental research and consulting services on know-how with respect to all phases of production and utilization of a new crop are essentials during these early stages. Furthermore, special studies will be required in the economics of production and marketing of new plants and plant-derived products—such studies should include measurement and control of quality, pricing and market development.

The task group recommended that an initial fund of $2 million be provided annually to underwrite the essential field and laboratory research required to improve production efficiency, processing practices, and byproduct development; to provide technical services to aid in solving problems encountered in large-scale production, marketing, and pilot-plant operations leading to expected expansion for the industrial use of a few highly promising new crops.

A MAJOR GAP

One of the major gaps in the knowledge of those who are or would be working with new and special crops is the comparatively small amount of objective information on specific needs of industry for plant-derived raw materials. The lack of identification of specific needs has been a deterrent to research and to progress with new crops. Industrial needs should be continuously surveyed and identified as guidance for specific and objective studies of plant resources.

SUMMARY

Eventual establishment of a new crop requires many years of objective continuous, cooperative, and coordinated research and development. Without such programs of continuous research, adequately supported, the big gaps will remain in our knowledge and beneficial use of the plant resources of the world.

STATEMENT OF A. E. THORPE, EXECUTIVE VICE PRESIDENT, DRIED FRUIT ASSOCIATION OF CALIFORNIA, SAN FRANCISCO, CALIF.

Mr. Chairman and members of the committee, this statement of views and comments on Senate bill 2306, otherwise known as Agricultural Research and Industrial Act of 1957, is submitted by the Dried Fruit Association of California, a trade association serving California's important dried fruit industry.

Membership in this association includes processors, packers, and grower-packers of approximately 95 percent of the State's dried fruit production. These members are composed of commercial packers and the two large cooperative dried fruit marketing associations, having a combined membership of 10,000 deciduous fruit and raisin grape growers.

The dried fruit industry is intensely interested in research. In fact, during this past year, under the sponsorship of the Dried Fruit Association of California, the industry established a research advisory committee supported with its own funds to initiate and carry on research at the University of California, Davis, Calif., and at the Western Utilization Research and Development Division of the United States Department of Agriculture, Albany, Calif. In addition to this a limited amount of basic research is being carried on within the industry itself. We believe implicitly that research will do much toward improved cultural practices on the part of growers, better processing methods and equipment on the part of processors, and increased utilization on the part of consumers both here and abroad.

We are heartily in favor of Senate bill 2306. This bill was designed to provide at least a partial solution to our agricultural surpluses, something that no program or programs during the past 25 years has been able to accomplish. We are not so sanguine as to expect that research is a panacea for all of our surplus problems nor do we expect to find overnight, through any amount of research, increased industrial uses which will provide a market for those products we produce in excess of demand. We do believe, however, that research will provoke creative thinking on the part of our researchers, our economists, and our representatives in Congress, which in the end cannot help but resolve many of the distressing surplus problems with which the Nation is now faced.

We would be opposed to setting up a new agency to administer a program such as the proposed Agricultural Research and Industrial Board. We are quite familiar with the regularly established agencies now operating under the United

States Department of Agriculture and believe they are fully capable of administering any additional research programs which may develop from this type of legislation. It would be a waste of public money to set up an entirely new agency which, in our opinion, would be a duplication and completely unnecessary.

We would like to bring to the committee's attention the extreme importance of a balanced, sustained, and well-planned research program for all agricultural products. One of the most vital factors in the security and defense of our Nation is an adequate food supply. This food supply is constantly being threatened by disease, insects, viruses, blight, water scarcity, soil depletion, and innumerable other natural and manmade enemies. Researchers under our present limited program are constantly striving to protect this food supply. Scientists are constantly seeking new and improved uses for agricultural products, improved processing methods, new products, new means of storage and protection, etc. Some branches of research are seeking better and more efficient ways of handling these products so as to bring them to the consumer in the best possible condition, at the least cost to the consumer, and with the highest return to the primary producer. This type of research must go on continuously, year after year, with no letup, and should be on a sustained basis to prevent disasters and crises, rather than to wait until such situations occur before taking belated action.

One of the things that concerns us the most is that the current emphasis on defense research may have a tendency to minimize research along other lines, such as in the field of agriculture. If agricultural research is neglected, we might very well, at some future date, find ourselves in the same place and subject to the same criticism, rightly or wrongly, that the Department of Defense now finds itself. We are fearful that the increased stress on military research may provide financial incentives which would make agricultural research less attractive to young men and women who, at this time, may be deciding upon their life profession or vocation. We reiterate that any research program should be well balanced and that agricultural research should be encouraged by every possible means.

In conclusion we wish to state our belief that agricultural research should receive the interest and attention not only of those of us engaged in the processing of food products but of every producer, every consumer, and—most important—the Congress of the United States who in the end will have the final say as to how large a research program agriculture will have.

STATEMENT OF MARSHALL BALLARD, JR., PRESIDENT, AMERICAN TUNG OIL ASSOCIATION, LUMBERTON, MISS.

Mr. Chairman and gentlemen, my name is Marshall Ballard, Jr., of Lumberton, Miss. I am a tung grower and cattle rancher. At present I am serving as president of the American Tung Oil Association and am a director of the National Tung Oil Marketing Cooperative, of the Tung Research and Development League, and of the Mississippi Cattlemen's Association.

I am addressing you today on the contribution which research, particularly research to increase the industrial utilization of farm products, may make toward achieving a balanced, progressive, and prosperous agriculture for the benefit of farm people and of our Nation as a whole.

One need only reflect for a moment to realize that the very welfare of our Nation rests upon an adequate and economical supply of food and other products of our farms and forests. Our Nation depends upon agriculture to provide the strategic commodities it needs for national defense.

It also expects agriculture to maintain an adequate reserve of productive capacity against a national emergency. Our Nation looks to agriculture to balance its production against current market demands, and to estimate and adapt that production to changing needs and conditions that will inevitably develop, not only within the Nation itself but throughout the world at large, particularly in this latter respect in view of our position of world leadership.

Our people expect agriculture to stay progressive and to strive constantly to maintain its efficiency of production at a level at least comparable to that of the industrial segment of our Nation's economy.

Agriculture is also expected to conserve and husband its resources so as to assure our ability to meet adequately the needs of future generations for food and fiber.

These are indeed large and challenging responsibilities, which I am proud to say agriculture has never for one moment shirked or been found unwilling to meet.

In return for its fulfillment of these responsibilities, agriculture has a right to and does expect to share fairly and commensurately with the other segments of

our economy in the enhanced standard of living that progress makes possible for all of our people.

Obviously, agriculture cannot discharge these responsibilities, or share in the ever-increasing fruits of our society, by operating completely on its own. It must of necessity depend upon a variety of industries to supply it with machinery and materials of production such as fertilizer, petroleum products, insecticides, and the like. It must also depend upon other industries to furnish it with the comforts of home and leisure that our present standard of living makes possible and that a prosperous agriculture could afford. It must also depend upon still other industries to process and market the end products made from the raw materials from our farms and forests.

In this respect, then, a progressive and prosperous agriculture provides a very real basis for the prosperity and well-being of many other segments of our national economy. And a research program that aims at keeping agriculture healthy by enabling it to maintain a safe reserve of productive capacity and yet avoid the continuation of the accumulation of surpluses would indeed be a tremendous contribution to all our Nation's people.

In order to give you gentlemen of the Congress a glimpse of the tremendous scope and worthwhileness of the objectives to be accomplished by such a research program, I would like to quote briefly from a rather compendious report made about a year ago by the Department of Agriculture on research needs in agriculture.

The report to which I refer was compiled by a so-called Committee on Research Evaluation, which consisted of administrators and division chiefs from the Department's top echelons.

The committee consulted continuously and freely during the preparation of its report with research leaders and advisory groups in agriculture and industry, and was assisted in the performance of its duties by 20 task groups, each of which was assigned a specific research program area for comprehensive and detailed review. These task groups, in turn, were assisted by State program people, as well as other experts at the national level. The Department's Agricultural Research Policy Committee also reviewed the report and approved its final draft.

I quote as follows from the report:

"The development of new and improved uses and market outlets for farm and forest products has assumed extreme importance during the past few years because of the ever-mounting surpluses in important farm commodities. The problems confronting producers of these farm products were highlighted in 1956 when a bill was introduced in Congress 'to provide for a scientific study and research program for the purpose of developing increased and additional industrial uses of agricultural products.' In this bill it is stated that 'current productivity of farms in the United States is substantially in excess of current markets for their products at price levels which provide fair and substantial income to farmers.' In the hearings on this bill the United States Department of Agriculture stated that 'to solve the surplus problem we must expand markets. We have three possibilities for doing this: (1) Stretch the export market as far as we can; (2) increase per capita consumption of higher quality foods; and (3) devise new uses for established crops and develop new crops with good market potentials as alternatives to those in surplus. We must use all three.'

"Congress also provided in section 209 of the Soil Bank Act for the establishment of a Commission on Increased Industrial Use of Agricultural Products to study the problem and recommend to the Congress actions which will bring about the greatest practical use for industrial purposes of agricultural products not needed for human or animal consumption.

"These facts have been taken into consideration in recommendations for substantial increases in the research to develop new and improved uses for farm and forest products, with particular emphasis on commodities currently in surplus.

"To a large extent, increases in food consumption in this country are proportional to increases in population. However, the producers, the processors, and the consumers of fruits and vegetables can benefit greatly from research aimed at the development of improved quality, stability, and convenience in processed products. Such development is based on potentialities revealed by exhaustive studies of the constituents and properties of products that can be exploited in new or improved products for the benefit of both consumer and producer. Because of the potential increased demand for livestock products and the consequent increase in numbers, there is a definite possibility of increasing feed uses for cereal and forage crops and oilseed meals.

"The market outlets for cotton and wool are being narrowed by the ever-increasing competition of manmade fibers. Prior to the advent of synthetic fibers,

cotton accounted for about 85 percent of the entire United States consumption of fibers, whereas at present it accounts for only about 64 percent of the total. Greatly expanded research on cotton and wool is needed to improve their processing characteristics and to give them added qualities which will enable them to compete successfully with manmade fibers.

"Maximum emphasis should also be placed upon the expansion of research to convert farm crops that are now being used primarily for food into products suitable for use by industry. Increased emphasis should also be given to economic and laboratory research to determine the industrial possibilities of new crops.

"A major forest problem on farms and other forest holdings is the large volume of cull trees and little-used species for which there are inadequate or no market outlets. The problem occurs in all regions of the United States, and is particularly serious in the vast hardwood areas of the East. The development of new or improved uses for this surplus poor timber would not only provide markets to producers but would permit its removal from the land where it increasingly occupies growing space that could be used to better advantage for the establishment of new and better crops of timber trees. Also, a tremendous volume of logging and primary manufacturing residues, as well as pulp-plant residues such as lignin, remain unutilized except for fuel. Research in this area should be directed toward the development of processes where large bulks of raw material will be required.

"Research in the laboratory and pilot plant to develop new and improved uses for farm and forest products must be supplemented by studies of price-quality relationships and the possibilities for enhancing market potentials through product improvements. The determination of the economics of new products, including measures of acceptability and economic feasibility, can assist in large measure in the commercial adoption of these products. Portions of the research programs described under many other objectives contribute to objective 11.

"When Congress in 1938 authorized the construction of four regional laboratories to do utilization research on farm products, it also authorized a nationwide survey by competent scientists to obtain information upon which to base a comprehensive research program. The resulting program has been gradually expanded during the intervening years. Similarly, the Forest Products Research Laboratory has developed a well-rounded program of research that includes such items as chemical wood; poles, piles, and tie timber; pulpwood; sawtimber; and veneer timber. However, there are so many needs and unexplored opportunities for improving uses and serviceability of farm and forest products generally that a considerable expansion of the research in this field is called for.

"Much too little attention has been given to the economic aspects of utilization. It is not enough to find methods of producing new kinds of goods. They must be produced at reasonable cost. And they must be able to meet competition from other products already on the market. This calls for increased emphasis upon economic research, both as a guide in product development and in analyzing and testing markets for products as they are developed."

The following changes in the present program are recommended:

"FARM PRODUCTS

"Because of the serious surplus situation in cereal grains, research on these commodities should be expanded very substantially, with emphasis on the development of food and feed products with higher nutritive value, and industrial products through chemical, physical, and microbiological transformations.

"In order to provide suitable feed supplies for the increasing number of livestock, the research to improve and preserve the nutritive value of forage crops during processing and storage should be expanded substantially.

"Because of current and potential future surpluses of vegetable oilseeds and animal fats, research should be substantially expanded to find new industrial uses for products obtained from the animal fats and vegetable oils, and improved feed uses for the oilseed meals.

"In order to increase the consumption of dairy products, research should be expanded substantially to develop a readily dispersible dried whole milk, to obtain information on the structure of milk components and the changes that take place during processing and storage, and to develop improved types of cheese.

"Research should be expanded on the production of improved poultry products, with special attention to the retention of flavor, and on the production of dehydrated whole egg that can be reconstituted more easily. Research should be initiated to develop improved defeathering, chilling, and freezing methods for poultry.

"Research on quality preservation and on the development of new meat products should be substantially expanded, with special emphasis on improving the tenderness and palatability of low-grade beef, and on the development of new methods of processing hides to obtain new and improved products.

"Because of the need to develop cheaper and more attractive processed forms of fruits and vegetables, research to develop stable and concentrated products that do not need expensive packaging should be expanded.

"Research to develop better methods of processing sugarcane and sugar beets should be expanded, and work to develop industrial uses for chemical derivatives of sugar should be initiated.

"To meet the increasing competition of synthetic fibers, research should be expanded very substantially on the basic fiber properties of cotton and wool and on the mechanical and chemical processing of these fibers to obtain products of higher quality with greater consumer appeal.

"*Forest products.*—Research should be expanded substantially to find market outlets for inferior hardwood growth, cull trees, and unused residues from logging and milling, with particular attention to the production of industrial chemicals from lignin; to producing new types of composite glued products from wood and wood-base materials; and to developing improved adhesives, preservatives, and fire retardants for wood, improved methods and fasteners for the structural use of wood, improved paper and resin-impregnated paper structural units, and better containers for industrial and agricultural products.

"*Domestic market research.*—Research should be expanded to provide more intensive analyses and wider coverage of commodities, with emphasis on market testing and development; evaluations of advertising and promotional activities; interproduct competition and market potentials; consumer discrimination and preferences as they relate to new and improved products; and the economics of the utilization of new and improved products.

"*Foreign market research.*—Research with particular emphasis upon analyses of foreign-government programs on production and trade should be expanded; also on trade agreement programs and United States programs to promote sale of farm products abroad; responses of foreign production and consumption to changing prices in world markets for various commodities; preferences of foreign buyers; and means for meeting competition from foreign-produced commodities and obtaining greater access to foreign markets.

"*New crops.*—Research to determine specific immediate and long-range new-crop requirements should be expanded, with particular attention to those crops which might be grown in place of crops now in surplus; to evaluate and screen plant introductions and maintain germ plasm; to develop industrial uses for products derived from new crops, with special attention to studies of the market potentialities and the anticipated costs and returns for the products derived from the new crops.

"*New types of animals.*—Research to develop improved types of animals should be expanded, with special attention to their adaptability to geographic areas and to various types of feed and forage; to explore the possibility of increasing the value of milking cows as meat sources; to develop improved meat-type hogs; and to develop methods for evaluating the meat and wool qualities of sheep on the hoof."

That concludes, gentlemen, the observations from the report.

In connection with the subject of research to develop new crops, it is perhaps needless for me to add that adequate safeguards should be included in any legislation that the Congress might see fit to write to provide for the research needs I have been describing, in order to insure that any funds that may be appropriated for such research may not be used to develop new crops or new end products from these crops that will compete with existing crops or merely result in shifting the surplus headache from one existing crop to another. This danger that could result from such use of research funds must be carefully provided against. I believe the reason for it is too obvious to require further comment.

In conclusion, gentlemen, let me say, as perhaps all of you already know, that the total sum of money from all sources, both public and private, that we are spending today on agricultural research is, indeed, most disproportionately small, relative to the huge sums of money being spent today by industry on research. And many of the products resulting from industrial research are today competing directly with agricultural products in the market place, and are contributing to the surplus problems of many of our farm commodities.

As things have stood to date and as they still stand at present, organizationwise, agriculture is not equipped to marshal the vast sums of money from private sources that industry does to get its research job done.

If agriculture is to meet the responsibilities which our Nation expects of it for the general public welfare, it must look, at least for the present, to public sources of funds for its research needs to maintain itself in a vigorous and healthy condition for the benefit of our whole Nation. We are confident that the Congress will recognize the utilization research needs of agriculture and provide adequately for those needs.

STATEMENT OF V. CONQUEST, VICE PRESIDENT, RESEARCH DIVISION, ARMOUR & CO., CHICAGO, ILL.

I have been in charge of the research activities of Armour & Co. since 1929. Prior to that time, I was a chemist in the packing industry, starting in 1915, with the exception of 2 years and 4 months, 1917–19, in the military service in the medical department and central medical department laboratories, AEF.

I have long worked closely with military and civilian agencies, particularly the Department of Agriculture, in furnishing information, advice and counsel on very many research programs. I first appeared before the House committee in the late 1930's, which considered and did recommend establishing of the four regional utilization laboratories of the Department of Agriculture.

In 1953, I was awarded the Nicolas Appert medal of the Institute of Food Technologists for excellence in research and technology in food products.

In 1956, I received the medal of the Industrial Research Institute for excellence in managing industrial research and development.

I have long been an advocate of the development of industrial products from agricultural products. In this connection I served on a Task Group for Hides, Skins, and Animal Byproducts to the President's appointed bipartisan Commission on Increased Industrial Use of Agricultural Products.

In the course of my work in the packing industry, one of the important aspects of research and development has been and is the seeking for new and more profitable uses for the products and byproducts of animal agriculture and meatpacking.

As an indication of the effectiveness of the research and development at Armour & Co., an entirely new industry and group of chemicals were developed from fats. This group of compounds is known as nitrogen fatty derivatives and include several hundred of new and unusual fatty chemicals with valuable industrial uses.

In the area of food products, Armour has long been a leader in the development and production of egg and poultry products, particularly a superior dried egg for military and civilian uses.

Through research Armour has long been a leader in producing lifesaving and health-giving drugs from animal raw materials produced in our packing operations. From this work came such drugs as antianemic preparations, thyroid, and ACTH.

I recognize that a great deal of time and effort has been spent by industry, university, and Federal laboratories in seeking and developing industrial uses for agricultural products. Many things have been accomplished, but in the face of our extremely productive agriculture, a great deal more work needs to be done. As a preparation for continuing and enlarging studies on industrial utilization of agricultural products, several bills have been introduced into Congress in the past. I have read the present bill under discussion, S. 2306, and believe that it contains the necessary provisions to permit a proper organization to start the necessary research and development. The passage of this bill, however, will not in itself assure the end desired. If the philosophy expressed and the financial backing can be maintained over a period of years, then industrial utilization of farm products can be assured.

With the passage of the bill, a host of difficult problems will need good solutions.

One of the more important acts is the choosing of the proposed Agricultural Research and Development Board so that the philosophy and farsightedness of businessmen, agriculturists, and scientists are available to manage the affairs of the Board.

The second major problem is the choice of the Director and his scientific personnel. The finding of a topflight director will not be easy, primarily due to salary limitations since directors of the caliber required for this important post are already gainfully employed in industry at salaries far beyond the limits that will necessarily be imposed in Government service. The same limitations are true in choosing the Director's staff. This difficult problem of finding suitable personnel will have a foreseeable adverse effect on reaching the objectives so well set out in S. 2306.

In addition to this personnel problem at the management level, similar difficult problems will be encountered in locating creative people in Government, industry, and universities whose thinking and new ideas are so important to reaching a satisfactory result.

The above in no way discounts the tremendous asset which we have in our various federally supported laboratories, all well directed, particularly in the Department of Agriculture and in other Federal departments. Our utilization laboratories of the Department of Agriculture, particularly, could use a larger budget where they could and would like to work toward the objectives of this bill.

The research and development laboratories of the agricultural industries have only been concerned with their own problems, but could very well contribute to the program envisioned in this bill. Land-grant schools and other universities could contribute both at the level of basic and applied research.

In my own company we could have contributed more to agriculture in general had not the 1920 consent decree against certain packers prohibited us from engaging in certain lines of activities. With freedom and incentive to work in all fields of agriculture and food, it is quite conceivable that more useful developments in industrial utilization of agricultural products would have come from research and development activities.

I like the provision for the establishment of fellowships and scholarships which, in a long-range program, should provide for future scientists to continue to work in this area. Under current conditions, the real problem is reaching the objectives envisioned in this bill is not dollars, but well-qualified people and scientists. Most of all in carrying out this program we will need energetic, creative, and farsighted people. These people, I fear, are already committed in other attractive positions and unless actuated by motives other than monetary, would not be available to this program. I hope that this bill, S. 2306, is passed so that we can at least start and organize to do the job which foreseeably should be continuous for the next many, many years.

STATEMENT OF MERLE A. DELPH, PRESIDENT, M. A. DELPH CO., INC., INDIANAPOLIS, IND.

Gentlemen, as advised Hon. Senator Carl T. Curtis in our letter of May 22 it is with regret that I find it impossible to be with you in person.

However I am pleased to submit the following which I shall make as briefly as possible as to why we need a bill similar to Senate bill 2306.

I had the honor and privilege of being a member of a Task Group for Hides, Skins, and Animal Byproducts and on January 21, 1957, our task group delivered to Mr. J. LeRoy Welsh, Chairman of the President-Appointed bipartisan Commission on Increased Industrial Use of Agricultural Products, our report. While I am not in complete agreement in every respect with Senate bill 2306 I do believe that said bill does give us the background and objectives that we wish to make towards stabilizing the agricultural economy of our Nation.

As we all know this great country of ours has learned to produce, in massive production, our agricultural products and in practically all cases production will exceed our ability to consume even under the most luscious and prosperous economy.

Historically the greatest progress of fundamental research came from European countries but through the dislocation of two major wars the burden as well as the opportunity to make these great contributions in science rests with this country. We must recognize this problem and we must take the necessary steps to take over and to go forward with research and incentives to utilize our mass production.

First I would like to take the research program:

(*a*) Government research policies, particularly in agriculture, should be directed toward greater emphasis on fundamental research.

The USDA regional laboratories were recently renamed utilization laboratories and yet how can these laboratories utilize without fundamental facts.

(*b*) Research for the purpose of finding and developing new industrial uses for agricultural products along with developing crops which are better adapted to industrial uses.

(*c*) Developing and finding new processes for utilizing agricultural products for industrial purposes and to encourage farmers and industry to convert these new crops as they are developed as a result of research to end use items that will find ready and expanding markets by the consuming public.

Next, let's take incentives:

(*a*) I would like to recommend, in order to stimulate research, that a national award or awards tax free be instituted and established to recognize the contributions of scientists and engineers whose findings are deemed as the most promising leads in discovering new uses of agricultural products.

(*b*) That this awards committee recognize both scientists and engineers in applied as well as pure research fields.

(*c*) That no distinction be made as to whether the scientists or engineers are employed by industry, commercial laboratories, nonprofit institutions, academic institutions, Government employed, or as individuals.

(*d*) The annual awards totaling $50,000 would not seem to me to be exhorbitant.

Would further like to recommend that after it has been determined by the Board or Administrative Agency that a new method has been developed that shows considerable promise which industry would be unable to undertake through its normal course because of the investment and risk that a recommended tax benefit or Government aid be extended, such as, where investment in plant machinery and equipment by the industrial company or individual that an authorized program be made available so that such industrial company or individual would be allowed to defer or to accelerate its amortization of this expenditure.

That the Board of Administrative Agency also have the power to make capital loans to industry or individual for plant construction machinery and equipment up to 100 percent of the investment at a nominal interest rate and that the loan be made without recourse, secured only by the capital investment.

Further that the Board or Administrative Agency also have the power to have Government-owned contractor operate plants with the operator receiving a fixed fee for the cost of his services in the operating plant.

I sincerely trust that this Senate Agricultural Committee will support Hon. Senator Carl T. Curtis, Hon. Homer E. Capehart, our good Senator from my home State, as well as all other members of the Senate so that a bill similar to S. 2306 will be completed and that same will be accepted by both the Senate and the House of Representatives by this the 85th Congress and I am quite certain would be signed by our great President.

Sorry I could not be present with you, however, if anything I have said here is helpful I am most pleased.

Statement of the National Council of Farmer Cooperatives

The National Council of Farmer Cooperatives favors the principles and purposes of S. 2306, the Agricultural Research and Industrial Act.

There is urgent need for a strong directive and coordinating force to enlist the interest of industry in the utilization of the raw materials produced on the farm; and to enlist the production of new and improved farm products which can supply the diverse needs of industry for raw materials.

We submit that if industry had followed the traditional pattern of agricultural research in allocating a disproportionate share of its research funds to problems of production of the raw materials, this country could never have achieved its present industrial leadership in the world of today. This is particularly true had the total expenditures for research in industry borne the same relationship to the gross product as has been the case in agriculture.

We can think of no activity more essential to the future prosperity of farmers than the development of the widest possible range of uses of the products of agriculture. This development will not come about through stubborn maintenance of the status quo in the allocation of the lion's share of money and effort to production research, but rather from a dynamic approach to the problems of a major breakthrough in those fields which have been so greatly neglected over the years—problems of new uses, adaptation to the needs of industry, marketing, distribution, nutrition, new products, new crops, and the economic problems that are inherent in such an approach.

In the survey of the National Science Foundation in 1953, all industry was spending 1.5 percent of total research funds on food and kindred products; 0.8 percent on textile mill products and apparel; and 0.8 percent on paper and allied products. Expenditures in the field of chemicals were 9.8 percent of total industrial research outlay (which involves some research on agricultural raw materials, to be sure). In contrast, research expenditures in the field of electrical

equipment were 21 percent of the total; in aircraft and parts 20.5 percent; and in other manufacturing industries, mostly automotive 16.3 percent.

It is recognized that in these industries with high expenditures for research, much of the outlay is included in contracts as costs of developing defense and defense supporting requirements, financed by the Government.

As a matter of fact, the National Science Foundation reported in that year that of Federal Government agency research funds, out of $2.08 billion, $1.5 billion was transferred to industry-oriented organizations; $970 million was spent in Federal Government research agencies; and $230 million was spent in colleges and universities.

In addition, industry-oriented organizations spent $2.35 billion of their own research funds and transferred only $20 million to colleges and universities, which also raised and spent $130 million of their own funds directly.

The Federal agencies supplied 52 percent of research funds and only spent 18 percent of them while industry raised 44 percent of the research funds and spent 72 percent. The Federal Government also supplied 61 percent of the research funds spent by the colleges and universities.

Thus the pattern has been set for financing the rapid pace of industrial research. Of the $2,459,000 spent by agricultural experiment stations in 1953–54 on utilization research, the Federal Government supplied $287,000. Eighty-seven percent of experiment station funds were spent in the fields of livestock and crop production and related fields of genetics, soil, entomology and zoology and nutrition; 23 percent of the total was spent in basic research; and 77 percent in applied research, with a small amount for development, according to the Science Foundation report.

With regard to basic research, the Federal Government financed 36 percent and did 11 percent; industry-oriented organizations financed 41 percent and did 39 percent; and colleges and universities financed 14 percent and did 47 percent of the research.

This pattern of the tremendous progress in industrial research is that the Federal Government, together with industry, financed 95 percent of industrial research and development, and industry-oriented organizations performed almost three-fourths of the industrial research and development.

Such industry-oriented groups include private industrial firms, which did 90 percent of the industrial research; and the other 5 percent was done by trade associations, technical societies, research institutes, commercial laboratories, and federally supported laboratories operated by industrial concerns.

We believe this points to the place for an industrial research board to supervise and direct research and development of industrial uses of farm products; with authority to contract for basic research largely with the universities, land-grant experiment stations, and the Agricultural Research Service, and to contract largely with industry for utilization research, pilot plant operation and engineering services necessary to establish the appropriate industrial use of farm raw material. This board should have the authority to control patents and their use on a royalty basis, or their outright disposal to industry under certain circumstances.

Such a board should have a staff of physical, chemical and economic engineers capable of initiating and analyzing proposals and supervising operations in this contract field.

The research services of the experiment stations and the Department of Agriculture have made a great contribution to agriculture in very diverse fields of activity, but history shows that a new agency to pinpoint its efforts on industrial research and development is necessary to a breakthrough on this sector of the farm research front: as witness the progress in soil conservation since the soil-conservation programs were created and financed separately as action programs.

STATEMENT OF R. B. TAYLOR, ADMINISTRATOR, OREGON WHEAT COMMISSION, PENDLETON, OREG.

Mr. Chairman, my name is Robert B. Taylor, of Pendleton, Oreg. I have prepared this statement at the request of Senator Carl Curtis for presentation by him on my behalf, since I could not arrange to personally appear before the committee.

I have devoted 33 years of my life to raising wheat, feed grains, and livestock in Umatilla County, Oreg. I have been interested in agricultural research and have worked quite closely with research groups, having served on research committees of wheat organizations, was a member of the Grain Research and Market-

ing Advisory Committee of the Agricultural Research Service for 6 years and have been a member of the Agricultural Research Policy Committee for 5 years.

At present, I am administrator of the Oregon Wheat Commission, which was established in 1947 at the request of the Oregon Wheat Growers League. It is authorized by law, among other things, to conduct a campaign of research, education, and publicity; to find new markets for wheat and wheat products; to give, publicize, and promulgate reliable information showing the value of wheat and wheat products for any purpose for which it is found useful and profitable; to make public and encourage the widespread national and international use of the special kinds of wheat and wheat products produced from the special varieties of wheat grown in Oregon and to take such action as the commission deems necessary or advisable in order to stabilize and protect the wheat industry of the State.

The commission is also authorized to cooperate with any local, State, or national organization or agency engaged in work similar to the work and activities of the commission and to enter into contracts and agreements with such organizations for carrying out a joint campaign of research, education, and publicity.

My purpose in presenting this statement to the committee is to express my thinking regarding industrial utilization of farm commodities as one means of making use of our bountiful agricultural production.

When I started farming, my main interest was in the field of production. My ambition was to produce large crops of good quality, specializing on those adapted to my area. Little did I realize at that time how important the matters of utilization and marketing would become or that I would finally spend most of my time in this latter field of activity.

Permit me to remind you of a few well-known facts regarding the current supply of several field crops produced in the United States. This information comes from a USDA publication put out by the Agricultural Marketing Service regarding stocks of grain dated April 24, 1958. I could refer to the current production situation, but since stocks on hand reflect the relationship between production and use, I will use this approach mentioning several of the more important field crops as of April 1, 1958.

Wheat.—Reports show that there were 1,121 million bushels of wheat in all positions. This amount was 18 percent above 1957, 44 percent above the 1947–56 average, and was the fifth largest supply of record.

Rye.—Fifteen million bushels were on hand, which was 18 percent above 1957 and 16 percent above average.

Corn.—Stocks of corn on hand in all positions amounted to 2,799 million bushels, which was 8 percent above 1957 and the sixth consecutive year of increase.

Oats.—Six hundred million bushels were on hand, an increase of 25 percent above 1957 and 11 percent above the average, and the third largest supply of record.

Barley.—Two hundred sixty-two million bushels were on hand, which was 29 percent above 1957 and amounted to the highest on record.

Sorghum grains.—The stocks on hand amounted to 424 million bushels, which represented an increase of 205 percent over the previous year.

Soybeans.—Two hundred fifty-four million bushels represented an increase of 18 percent over the previous year and was a record high.

The above figures indicate that our productive capacity in relation to total use is increasing. I am sure that all of you have much more supporting evidence than I have to back up that statement.

In a country as rich in natural resources as is our United States, it is, in my opinion, very important to make efficient use of these resources in such a way as to contribute the most to the economic development of the country and the welfare of its people. When there is an imbalance between production and use, it becomes necessary to face the problem of bringing these two factors into balance, insofar as possible and practical.

There are three ways to do this, one is to reduce production, one is to increase uses, and the third might be a combination of these two.

For reasons with which I am sure you are familiar, past attempts to reduce or control production of agricultural commodities has not been a practical solution, even though that method is used to some extent in other segments of the economy. Wealth comes through production, not through failing to make use of the many resources with which we are blessed.

A farmer usually operates about as much land as he has been able to acquire in his efforts to own and operate an economic unit. Even though reducing production might net him as much income as greater production at lower prices, still it is natural for him to maintain production at high levels, even though this

is above effective market demand. A farmer naturally resists production controls and is anxious that ways be found to increase use.

This period of abundant production in which we fine ourselves is due, of course, to several factors including favorable weather and improved technology, much of which has stemmed from agricultural research.

The current supply situation and the probability that the trend in production will continue to be upward and in excess of requirements for an increasing population, gives occasion to considering very carefully possibilities for increasing the use of our agricultural production in order to maintain farm incomes at levels more in line with income of other segments of the national economy, and to make the most efficient and economic use of our productive capacity.

In 1946, the Congress passed Public Law 733, frequently referred to as the Research and Marketing Act. This law was intended to give a very definite boost to agricultural research for the purpose of promoting the efficient production and utilization of products of the soil as essential to the health and welfare of our people and to assure agriculture a position in the field of research equal to that of industry, thereby aiding and maintaining an equitable balance between agriculture and other segments of the economy. Emphasis was given to research relating to the development of present, new, and extended uses and markets for agricultural commodities and byproducts as food, or in commerce, manufacture, or trade both at home and abroad, with particular reference to those foods and fibers for which our capacity to produce exceeds or may exceed existing economic demand.

This act provided for increased research in the fields of production, utilization, and marketing. Production is a necessary part of any research program in spite of its possible contribution to increase yields and supplies. The health and welfare of the consuming public demands that research in the field of production be continued in order to guarantee ample supplies of food and fiber, which supplies are subject to ravages of insect and disease at any time. Failure to have a reservoir of knowledge resulting from production research would endanger the future of our Nation.

However, as supplies have increased over the years, more emphasis has been placed on research in utilization and marketing.

Research in marketing does not always result in increasing outlets for bountiful production, particularly in domestic markets. Increased efficiency resulting from improved marketing practices frequently results in making available supplies go further.

It is in the field of industrial utilization that the imagination of many groups has been captured as a possible means of developing end uses not previously known or used. "New crops and new uses through research" is a phrase that we frequently hear. I am in favor of developing new crops, but is anything gained if a new crop merely increases the supply for an end use amply supplied by current crops, or is there anything gained in developing new uses for current crops if that use takes the market from some other crop? Much has been done in the field of utilization research but there still is much to do if this approach is to help us justify the continuation of abundant production.

The interest of Congress in this whole matter led to the enactment of Public Law 540 of the 84th Congress which established the Commission on Increased Industrial Use of Agricultural Products. This was a very definite step in consideration of the problem as to how best bring about the most practical use of agricultural products for industrial items needed for human or animal consumption, including the manufacture of rubber, industrial alcohol, motor fuels, plastics, and other products. You are familiar with the activities of this Commission and its report to the Congress. Consequently, I will not burden you with detail except as it bears directly on your present considerations.

I served as a member of the Grain Task Group set up by this Commission. Consequently, I have a fairly clear picture of the tremendous amount of concerted effort expended by uncompensated individuals representing all fields of activity related to the production, processing, research, and end use of agricultural products. Certainly the comprehensive studies carried on by the task groups and submitted to the Commission brought together a wealth of information regarding industrial research and industrial use, the scope of which was too great to permit inclusion of details in the report of the Commission to the Congress. It did emphasize that much had been done in the field of utilization research, but still quantities of farm products moving into industrial use remained at a minimum. The studies also provided answers for many suppositions that had been rampant and in some instances turned up a definite "No" to some approaches assumed by certain individuals to be the hundred-percent answer.

New uses and new processes have been found through utilization research. Most findings are related to the technical aspects rather than the economic.

A study of the Commission's report will show that expansion in the field of industrial uses of farm products is entirely possible, providing that the commodity being considered is available to industry at a price that will enable it to be processed and put on the market at prices which are competitive with similar products from other supply sources.

In my opinion, the economic aspects of industrial utilization of farm products are the stumbling blocks to success. If industrial alcohol from corn can return only 50 cents per bushel, its use will not be of much help to achieving the objectives under consideration. Much could be said on this subject, but it is dealt with at some length in the Commission's report.

The report of the Commission to Congress has given occasion for suggested legislation and these hearings on what should be done by the Congress to promote industrial utilization of farm products.

The Commission made 10 major recommendations in its report to the Congress. No doubt, S. 2306 introduced by Mr. Curtis and others, is a step toward implementing that report. Since I do not take any particular exception to most of the recommendations, I will not discuss them in detail.

The eighth recommendation deals with suitable incentives to industry to hasten new industrial uses, and calls attention to the present patent policy of the Department of Agriculture. This provides that any patents resulting from contract research shall be made available to the public through assignment to the Secretary, or otherwise. This policy discourages industry from doing contract research and commercial development of new processes resulting from Department research. Industry is reluctant to invest funds for development knowing there is no protection to them if any competitor desires to get into the picture, taking advantage of this development but not sharing in the cost.

I believe this policy might be so modified as to increase the incentives for private industry research. Perhaps it would be possible to grant protection for a period of years or provide lead time to any industry willing to risk funds to develop new commercial processes, the outgrowth of industrial utiliization research. I feel that the present patent policy discourages participation by industry in the research program, particularly, as related to industrial utilization.

S. 2306 evidently deals with the ninth recommendation of the Commission and provides for the creation of an independent Agricultural Research and Industrial Board with five members clothed with the proper authority and responsibility for allocating funds to carry out, direct and coordinate a comprehensive program for research, process development, pilot-scale tests, market studies, trial commercialization, and educational work in order to advance the greater utilization of farm products and the development of new crops.

I question if such a Board should be set up as an independent agency and would like to call your attention to the alternative administrative plan suggested by the Commission in discussing its ninth recommendation.

Under this suggestion, page 104, Senate Document 45, an Agricultural Research and Industrial Board would be set up within the Department of Agriculture under a single administrative officer with the rank of Assistant Secretary of Agriculture in charge of research in the Department.

This Board would be more than merely advisory, having authority to act in operating and decision-making matters. This would be a definite improvement over the present arrangement wherein the Assistant Secretary in charge of research also has the responsibility for a variety of activities widely removed from the field of agricultural and industrial research.

Some proponents of an independent board have felt that this would be necessary to attain the aggressiveness and accomplishments desired intimating that research people in the Department of Agriculture would not provide the necessary push for an expanded program in utilization research.

While it might be justly claimed that progress in industrial utilization research leaves something to be desired, still it should be pointed out that limitation of funds, facilities, and personnel has had more to do with the lack of progress than has the disinterest or unconcern of those responsible for research in the Department.

Any board set up for this purpose would have to make use of research talent currently available and much of that is in the Agricultural Research Service of the United States Department of Agriculture. Therefore, it would be more practical to use this talent under an internal arrangement. For an independent board to call upon that assistance which it would need, would merely disrupt

current research work underway causing confusion, inefficiencies slow down and frustration. An independent board might find itself providing competition to the research work of the Department of Agriculture.

In my opinion, it would be much more practical to make use of the alternative administrative plan mentioned by the Commission in its report rather than the one suggested in S. 2306. My close association with and observation of the agricultural research program during the past 11 years leads me to the above conclusion.

Certainly, additional funds will be required if there is to be an increase in research on industrial uses. The exact amount is problematical and should be carefully considered by those who are in position to determine the amounts that can be efficiently used, taking into consideration availability of personnel, facilities, and the possible results.

The continuing availability of funds for research programs is absolutely essential. The 10th recommendation of the Commission proposing funds from customs revenues merits consideration.

While my interests are mainly wheat, I believe my comments are applicable to research in industrial utilization as related to the field crops, at least.

In conclusion, I would like to suggest that there is no easy readymade solution to the utilization problems that confront us. Until we face up to the economic aspects of utilization research and acceptance by industry, we cannot hope for much success in this field. Who knows, but perhaps through the avenue of research the economic aspects of industrial utilization will be solved. Research in the field of industrial utilization should be strengthened and expanded, if not by the establishment of an Agricultural Research and Industrial Board, then through current utilization research organization and facilities. A crash program, such as providing huge sums of money and anticipating immediate results is, in my opinion, not the correct approach. I believe the suggestions of the Commission on Industrial Utilization should be carefully considered and proper legislation passed as the way to strengthen and expand industrial utilization of agricultural products.

STATEMENT OF GEORGE E. JOHNSON, CHIEF ENGINEER AND MANAGER, STEAM GENERATING DIVISION, CENTRAL NEBRASKA PUBLIC POWER AND IRRIGATION DISTRICT, HASTINGS, NEBR.

Gentlemen, my name is George E. Johnson, and I am a resident of Hastings, Nebr. I am a civil and electrical engineer. I began practice as a consulting engineer in 1907. My work consisted of engineering and construction of steam-electric powerplants, industrial plants, various types of municipal work until April of 1915 when I was appointed State engineer of Nebraska. in charge of irrigation, highways, and drainage. I served four 2-year terms until April of 1923. From April of 1923 to September of 1935, I practiced consulting engineering and construction on public works and industrial plants.

In September of 1935 I was appointed chief engineer and general manager of the Central Nebraska Public Power and Irrigation District and have been with this district continuously, with the exception of 3 years when I was in Argentina where I had an engineering contract to develop irrigation and electric power for the Argentine Government. Also, I was chairman of the board of managers of the Nebraska Public Power System from 1939 to 1948.

Since 1915 a large part of my work has been the development and operation of irrigation and the improvement of agriculture. Soon after World War I, a group of us in Nebraska and Iowa, realizing that for many years there would continue to be a surplus of agriculture crops, containing starch and sugar, organized to see what could be done in regard to industrial uses of surplus agriculture crops.

National Agrol Co., was organized and this company succeeded in getting an allocation of funds from the residue of German patents that had been sold by the United States Government to purchase and convert a small industrial plant at Atchison, Kans., into a distillery. Many tests were made in that plant and a considerable amount of basic information was secured on the use of alcohol as a motor fuel and the use of agriculture crops for industrial purposes.

At the beginning of World War II, Mr. Frank Robinson, of Kearney, Nebr., and I worked with the subcommittee of the Senate Agriculture Committee, headed by Senator Guy M. Gillette. After studies were made by this committee and a special committee appointed by the President, headed by Mr. Bernard Baruch, an allocation was made for 3 alcohol plants in the Midwest; 1 plant at Omaha, 1 at Kansas City, and 1 at Muscatine, Iowa.

Frank Robinson and I organized the Farm Crops Processing Corp. This corporation secured an allocation of material and entered into a contract with the Defense Plant Corporation for the construction of the alcohol plant in Omaha. This plant was to produce 50,000 gallons of 190 proof alcohol per day. I was president and general manager of the Farm Crops Processing Corp., from the time it was organized until the first of the year, 1948. With the new methods of manufacture of alcohol we had developed by using the materials and equipment that had been allocated for a 50,000 gallon of alcohol per day plant, we were able to produce 96,000 gallons per day, with an overall average of 90,000 gallons per day in the Omaha plant.

This plant was the first alcohol plant to be constructed to operate on a continuous process. Also, it was the first alcohol plant constructed to produce high-grade alcohol from spoiled grain.

In this plant we developed several new methods of using surplus grain and improved yields and lowered the cost of producing alcohol. We developed a new method of cooking mash, increasing the yield 15 percent. We developed the manufacture and use of an antibiotic which doubled the growing of yeast with the same equipment. We developed mechanical agitation in the fermenters to liberate the surplus CO_2 gas, doubling the capacity, shortening the time of fermentation and reducing bacterial growth. These improvements increased the yields of alcohol from the grain. We developed a new method of grinding grain, eliminating the dust-explosion hazard in plants grinding large amounts of grain.

This plant was constructed to use any agriculture product containing starch or sugar. We used all kinds of grain and as much as 80 carloads of potatoes per day. We produced 190 proof alcohol, fusel oil, corn oil, soap stock, potato flour, and during the sugar shortage, which followed World War II, we changed 1 of the 2 lines of production over to the manufacturing of a neutral flavored malt syrup with a daily production of 300,000 pounds. This malt syrup was used principally by the baking industry and in the making of ice cream, candy, and soft drinks.

The development of these processes in the plant owned by the United States Government prevented anyone from capitalizing on these new developments by patents. The processes are available for anyone to use without paying royalties for their use.

Also, a considerable amount of work was done on the separation of starch from the protein before the starch was used for the production of alcohol. This process allows the protein to be used with cereals and gives a more balanced food ration as practically all of our cereals are short of protein. Since the Omaha plant was closed, the United States Department of Agriculture has further developed the separation and use of these proteins and the process is now being used by Kellogg in their "K" cereal. If the protein is separated from the grain before the manufacture of alcohol from the starch, and these proteins used to fortify cereals not only in the United States, but also in foreign countries, all of the protein from our grains could be used and would assist in improving the food supply of the nations with which we are cooperating. The starch would be a byproduct and the alcohol manufactured from this starch could be sold in competition with any other alcohol or in competition with gasoline for motor fuel. It is my opinion, based on several years' work and study, that at least 80 percent of the surplus farm crops could be disposed of in this manner on a profitable basis to the people of the United States, and the subsidies and controls could be entirely eliminated from 80 percent of the present farm program.

During the last 6 months of operation of the Omaha plant for war purposes, the cost of manufacturing alcohol was 55 cents per gallon. At the same time, the average price the Government was paying the alcohol industry for the alcohol used by the Government was from 90 to 95 cents per gallon for 190 proof alcohol. The 55 cents per gallon included all costs of grain, operating costs and rent paid the Government; also 2 cents per gallon profit with a credit back for the byproducts sold.

The alcohol plant at Omaha can use 40,000 bushel per day of the grain that is going out of condition, and produce 2.75 gallons of high-grade 190 proof alcohol per bushel from such grain. The sale of the byproducts will pay the cost of operation.

I am thoroughly familiar with all the materials and equipment used in the construction of the alcohol plant at Omaha. The best estimate I can make at this time on the cost of reactivating this plant would be $600,000, and the plant could be placed in operation in approximately 2 months from the time work began to reactivate the plant.

During the operation of the Omaha alcohol plant, a considerable amount of research work was done on the industrial use of farm crops. Some of this work was carried through the pilot-plant stage and the more important improvements were built into the plant either at the time of construction or by changes during operation. If the plant is to be reactivated and placed into operation, provision should be made for the construction of a laboratory, to carry on the research program started by the Farm Crops Processing Corp. A laboratory adequate for this purpose would cost approximately $400,000. Through the work done in this laboratory and the improved processes carried out in the plant, a program could soon be worked out to eliminate approximately 80 percent of the cost of the present farm program.

ALTON BOX BOARD CO.,
Alton, Ill., May 28, 1958.

Hon. CARL T. CURTIS,
Senate Agriculture Committee,
Senate Office Building, Washington, D. C.

SIR: I make this statement in behalf of our company, which is engaged in the manufacture of paperboard, and also as a member of the Agricultural Residues Task Group of the President's Commission on Increased Industrial Uses for Agricultural Products.

The paper and board industry is one of the largest consumers of farm and woodland products. The materials it consumes annually include:

Wood pulp valued at	[1] $1, 564, 000, 000
Wastepaper valued at	231, 000, 000
Straw, rags, etc., valued at	50, 000, 000
Other materials valued at	453, 000, 000
Total	2, 300, 000, 000

[1] United States census of manufactures, 1954.

Among the other materials consumed are large quantities of wool (used in the manufacture of paper mill felts), pesticides, adhesives, sizings, and coatings, many of these being of farm origin.

The industry is rapidly growing, with increasing needs for raw materials.

Over the past 10 years it has been growing at a rate of over 4 percent per year.

It is predicted that United States production of paper and board will increase 56 percent between 1957 and 1970.[1]

The industry is constantly introducing new products and processes, requiring new raw materials.

Examples: Pulp from hardwoods and bagasse, coated and impregnated food boards, hardboards, stretchable paper.

Paper and board are high tonnage commodities that are sold at relatively low prices. This means that—

Raw materials for the industry must be available in large quantities and at reasonable cost.

The industry must buy its raw materials from the most economical sources, whether they are based on agriculture or not.

Much more research is needed to increase the industry's use of farm raw materials.

Papermaking is more of an art than a science.

Its needs are being supplied increasingly by industries based on mineral raw materials, such as petrochemicals, because these industries have outstripped agriculture in research on industrial applications.

Some examples of research needed to expand markets for farm products:

Improving the economics of supplying paper mills with straw and other agricultural residues.

Improving the efficiency of cutting, handling, and transporting pulpwood from farm woodlots.

Developing new fibers for papermaking (bamboo, kenaf, ramie, etc.).

Developing the technology and economics of converting farm residues into structural and insulating board and into dissolving pulps for plastics, films, and fibers.

[1] Stanford Research Institute in The Paper Industry, May 1958.

Basic research on the lignin, cellulose, and hemicellulose of farm residues and wood, to discover new uses and markets.

Developing new and improved papermaking additives of farm origin, such as starches, proteins, waxes, gums, resins, and oils.

Such research requires the cooperation of agriculture, industry, commerce, and private research.

Agriculture can provide research on the production of new and improved raw materials.

Industry can provide trials of these materials under practical papermaking conditions, and under the guidance of industrial economics.

The proposed program will be most productive if it is so organized as to overcome the isolation from industry and commerce that has characterized agricultural research in the past.

In my opinion, many of the manufacturers of paper and paperboard would gladly accord their fullest cooperation in implementing the proposed legislation, especially through pilot scale testing and trial commercialization of new crops, processes, and uses.

Respectfully submitted.

M. W. SWAIM, *President.*

ALTON BOX BOARD CO.,
Alton, Ill., June 2, 1958.

Hon. CARL T. CURTIS,
Senate Agriculture Committee,
Senate Office Building, Washington, D. C.

MY DEAR SENATOR CURTIS: This is in reply to your request for a statement relative to S. 2306, a bill providing for increased use of farm products for industrial purposes.

I served as consultant to the President's Commission on Increased Industrial Uses for Farm Products. I am also vice president and chairman of the research committee of the Chemurgic Council. This 20-year-old, nonprofit organization has as its objective the promotion of industrial uses for farm products and of new crops for industry.

My extensive unpaid services for the Chemurgic Council testify to my conviction of the soundness of this approach to the farm problem. A substantial program of research to this end, as embraced in S. 2306, is the proper means for developing industrial markets for farm products.

Much of this research would best be directed at improving the economics of industrial use of farm products.

It must be recognized that such research is not a panacea nor an antidote for unwise farm legislation. As industrial raw materials, farm products are competitive with mineral raw materials. Often industry has the choice of using one or the other. Industry, understandably, will use the raw materials that are most economical. Artificially high prices for farm products is the greatest handicap to their more extensive use in industry.

Given a more healthy competitive economic climate for American agriculture, your proposed legislation makes a great deal of sense. The potential for greater industrial use of farm products is vast. Research, as proposed in S. 2306, can open up this potential, with the promise of alleviating the problem of farm surpluses and developing new, permanent markets for farm products, such as cannot fail to increase the productiveness and prosperity of agriculture, while conserving mineral raw materials.

Sincerely,

K. STARR CHESTER,
Technical Adviser, Paperboard Division.

ST. LOUIS, MO., *May 26, 1958.*

Hon. CARL T. CURTIS,
United States Senate,
Washington, D. C.

DEAR SENATOR CURTIS: This is a belated acknowledgement of your telegram of May 20, inviting me to appear before the Senate Agriculture Committee on June 4 in connection with the hearing on industrial uses of agricultural products.

I regret that circumstances are such as to make it impractical for me to appear

in person. However, as a part of this letter I am including a brief summary of my personal views in connection with the whole matter.

I especially wish to call your attention and that of the committee to the emphasis which has been placed on the need for fundamental research in the various areas covered by the subcommittees in their deliberations and in their reports to the Commission. In addition, I especially wish to call the attention of the committee to the two paragraphs from page 17 of Document No. 45 as published for the 1st session of the 85th Congress, entitled "Report to the Congress from the Commission on Increased Industrial Use of Agricultural Products." The two paragraphs follow herewith:

"The Commission therefore wishes to emphasize that it believes greatly expanded basic research is highly essential if agriculture's output is to attain maximum expansion of industrial utilization. Basic research provided the capital knowledge which, when applied, will build a structure of new commercial outlets.

"The task groups which aided the Commission were unanimous in insisting that basic research in their respective fields is a preeminent requirement."

I wish to emphasize my wholehearted endorsement of the recommendations, 10 in number, which were made by the Commission to the Congress. Beyond this there is little to be gained by further elaboration of my views.

There is no doubt in my mind that the expenditure of the sums proposed by the Commission, properly administered, in accordance with the recommendations of the Commission, would go a long way in relieving the economic ills of the agricultural section of the Nation's producing facilities.

I believe that all intelligent people will recognize the need for development of new uses of agricultural products as a sound solution to the overproduction of agricultural commodities which have grown largely out of overemphasis on means of increasing production without at the same time supporting this with basic research and product development to absorb the output thus attained.

Respectfully yours,

R. H. RICHARDS,
Chairman, Task Group on Hides, Skins, and Animal Byproducts, and Vice President, International Shoe Co.

STATEMENT OF WILLARD C. LIGHTER, EXECUTIVE VICE PRESIDENT, THE GLIDDEN CO., CLEVELAND, OHIO

Mr. Chairman, members of the committee, during late 1956 and the early part of 1957 I served as a member of the Task Group for Oilseeds and Animal Fats of the President's appointed bipartisan Commission on Increased Industrial Use of Agricultural Products.

In my testimony today I wish to bring to your attention what I judge to be the more important findings of that task group. These findings support the need for increased research directed toward new industrial uses of fats and oils such as contemplated by bill S. 2306.

Fats and oils are tremendously important to the United States farm economy. Yet they have never received the recognition nor the attention accorded such crops as cotton, wheat, corn, and tobacco. This, I believe, is largely because fats and oils are not generally a direct product of the farm. Our animal fats are a byproduct of meat production and reach the market as a product of the packinghouse, both large and small. Cottonseed oil must be separated from the high protein meal which makes up the bulk of the cottonseed which is itself a byproduct in the production of lint cotton. Soybean oil reaches the market as a commodity only after separation from the high protein meal which makes up about four-fifths of the weight of the soybean and the economics of the separation dictate that it be accomplished in large specialized plants. Industry has been a very efficient processor and merchandiser of fats and oils for the farmer and at a very modest cost. In fact, the returns in profit to industry on the capital invested have, under free market conditions, been well below the rate of return repeatedly approved by governmental control bodies for public utilities.

Although fats and oils reach the market place as separate commodites only after the animals and oilseeds have been processed by industry, they nevertheless represent an extremely important source of income to the farmer. In the crop year beginning October 1, 1955, the value of all fats and oils, excluding butter, was estimated at $2.1 billion. This was more than wheat at $1.8 billion, one-half of all dairy including butter, and about one-half of the total corn crop, but several times the commercial corn crop which is normally some 12 to 15 percent of the total. Fats and oils are big, important business for the United States farmer.

It is important for us all to recognize that the most significant change in the pattern of domestic farm production over the past two decades has been the phenomenal expansion of oils and fats production in the United States. Prior to World War II, the United States was a deficit nation dependent upon large-scale imports for fat and oil supplies for both industrial and edible usage. From this deficit position the United States has emerged as the largest producing area and the largest net exporter in the world. For the crop year beginning October 1, 1955, exports of edible oils and fats approximated 2.75 billion pounds. During a period of growing postwar surpluses of other farm commodities, this growth trend and need for fats and oils has been a trend that is deserving of greater attention.

While such oilseed crops as flax, safflower, castor bean, cottonseed, peanuts, and tung nuts have all played a part in our growing fats and oil production, the primary single crop responsible has been the soybean. In 1935–39 United States production of soybeans averaged 56 million bushels. By 1945–49 this had almost quadrupled to an average of 209 million bushels. This steady upward climb in production has been maintained and the 1957 crop set a new record of 480 million bushels. This record crop in 1957 required nearly 22 million acres of cropland. Most of the acreage was in the central Corn Belt. If planted to corn, this acreage, at an estimated yield of 70 bushels per acre, would have produced 1½ billion bushels of corn. This would have increased an already surplus crop by over one-third. All of this increase would have been additional surplus.

So far the Government has never shown a loss on support programs for soybeans. Further expansion of soybean and other oilseed acreage is desirable. Such expansion will not mean the trading of one surplus crop for another.

The first reason why this is true is because oils from oilseeds are produced jointly with proteins. Abundant supplies of protein are a fundamental requirement of a sound animal and poultry industry. Balanced rations will require far more protein than present and indicated production will supply.

The second reason why we will not be trading one surplus crop for another is because the oil portion of the oilseed represents few pounds per acre. While this oil may temporarily be in surplus, foreign markets can be found and research can open the way to large domestic industrial markets.

A few simple facts will serve to illustrate why we should continue to divert surplus acres to oilseeds.

An acre of corn produces some 2 tons of corn. An acre of soybeans produces 1,000 pounds of high protein feed and about 200 pounds of oil.

Our farmers need all the protein we can produce if we are to approach a sound animal and poultry industry with balanced rations.

Thus, instead of storing surplus corn at the rate of 2 tons per acre, the worst picture with soybeans would be the possibility of some surplus oil stored at the rate of 200 pounds per acre. Liquid oil can be handled much more cheaply than grain.

While the exact figures vary, other oilseeds would show a comparable picture as related to grains.

We should now look at the way research, as proposed in bill S. 2306, can help in the diversion of farming acres from surplus crops to oilseeds.

In our domestic markets there is little possibility of increasing the edible consumption of fats and oils. Per capita edible usage of oils and fats is commonly recognized as the most inelastic item in our economy. Since World War II prices for crude vegetable oils have ranged from 8 or 9 cents per pound to 42 or 43 cents per pound. With this wide range of price, per capita consumption has remained almost constant. Edible consumption increases only as population increases.

If we look at industrial uses of fats and oils, we find a different picture. The expansion in total United States production of fats and oils has been accomplished despite severe volume losses in two major domestic industrial markets. These are the replacement of household soaps with petroleum derived synthetic detergents and the increasing use of synthetics in the production of protective coatings. In 1945 soap consumption per person was 23 pounds compared to 1 pound per person of detergents. In 1955 we find the per capita consumption of detergents had grown from 1 to 15 pounds while soap had declined from 23 pounds to 8.

In the past two decades, the consumption of protective coatings has doubled while the use of drying oils has increased only about 25 percent. The ratio of oil consumption to production of protective coatings has declined from 2.4 pounds per gallon to about 1.4 pounds.

Fats and oils are extremely useful, versatile, chemical raw materials. The potential of aliphatic chemicals has barely been tapped. The chemists tell me that the unique molecular characteristics of fats and oils give them valuable properties which cannot be matched economically by petroleum synthetics.

There is a real and a large industrial potential for farm-produced fats and oils. The market need not be lost to petroleum by default.

The key to expanding industrial use of fats and oils is research. The task group strongly recommended that Government research in oils and fats be directed to basic and fundamental research which is aimed at the acquisition of fundamental knowledge, rather than the direct utilization of a raw material for a particular use or end product. Such fundamental information supplies a tool for the use of all industry in developing new end uses and products. The task group was repeatedly advised that the big difficulty in new uses for fats and oils was the lack of fundamental knowledge about such things as composition, component separation, and fundamental reactions.

It seems that people doing research for governmental agencies face one of the same difficulties as do people in private industry. Members of both the Congress and of the executive branch of Government are much more impressed by a large piece of pilot plant equipment than they are by a single sheet of paper. Yet, today the pilot plants fail to work because we have not developed the new fundamental knowledge.

Another area in which research in fats and oils is notably weak is in the number of people working and being trained as research people on fats and oils. In research being carried on by the Federal Government, we find that during the forties only 58 people were employed in fats and oils. Currently only 67 people are employed. This would hardly fill one hallway in any respectable petroleum laboratory today. Furthermore, we find that in making an investigation of research being carried on in our land-grant colleges, both the volume of research and the number of fellowships are dominated by the petroleum industry. Very little work is being done to develop new uses for farm commodities. In fact, the number of people being trained for research in the field of fats and oils is so small that it would be impossible to implement any real crash program in fats and oils research.

Quoting from a summary of current research supplied by the USDA and included in the appendix of our report: "Possibly a dozen chemists are working on the use of fats in plastics. The petroleum chemical industry has literally thousands engaged in placing their products in the same potential markets. No wonder agriculture is losing out."

I would summarize the high points of the findings of the Task Group on Fats and Oils as follows:

(1) Fats, oils, oilseeds are tremendously important to United States agriculture.

(2) They have a 20-year record of sound, economic growth at small cost to the Government; in the case of soybeans, at no price-support cost.

(3) Many acres now in surplus crops or in the soil bank can be diverted to oilseed crops.

(4) To implement this diversion of acres to oilseeds, we need additional research in fats, oils, and oilseeds. Basic research is especially needed. More trained personnel is a first requirement.

It is my opinion that the findings of the Task Group on Fats and Oils point up the tremendous need for accelerated and greatly increased research in fats and oils. Without this research, tremendously important markets will continue to be lost to the petroleum industry by default. This will be in spite of the fact that for many uses farm produced fats and oils are chemically better raw materials.

BROOKLYN, N. Y., *June 3, 1958.*

Senator CARL T. CURTIS,
Senate Office Building,
Washington, D. C.

DEAR SENATOR CURTIS: Thank you for your telegram of May 27 inviting me to voice my suggestions at your hearing on June 4 with regard to the industrial uses of agricultural products, called chemurgy.

Unfortunately, I am presently in Germany at Frankfurt am Main where this is being dictated, to be transcribed in my office in Brooklyn. I have been invited to give a plenary lecture to the European Congress of Chemical Engineers representing American developments in this field. I have selected as my topic the production of acetic acid which can often come from waste agricultural materials, although presently it is largely produced in a synthetic manner.

As one who has worked for 30 years in the industrial utilization of farm crops, I am in hearty sympathy with everything that can be done to encourage an enlargement of this program for the good of both agriculture and industry.

Proper development programs have been shown to be capable of the expansion of industrial utilization. Such programs as have recently been supported by our Government have, however, made very little utilization either of consulting chemical engineers or of university laboratories and faculties. Chemical engineers in both categories in many cases not only have major interest in this subject but also have backgrounds of work and programs which could be of tremendous help to this effort as a whole. It is hoped that any future programs may make better use of these talents, which are often available merely for the asking, in this important program. In some cases contract research for development programs in universities might augment the necessary knowledge in particular fields.

Our agricultural program supplies three principal and fundamental raw materials: carbohydrates, proteins, and oils.

The carbohydrates are important as foods, as are the proteins and the oils. The carbohydrates are also very important as a source of cellulose, from forests, farmers' woodlots, and cotton. These agricultural products, as cellulose, always go into industry of one form or another, which by its competitive nature, utilizes these raw materials in conversion to industrial products with greater final value. Research and development in cellulose utilization is a major force which should be encouraged to improve the competitive position of cotton so that it would not require price support.

Another important industrial utilization of carbohydrates is in the fermentation industries, which depend primarily on these materials as food for microorganisms which produce alcohol, other solvents, antibiotics, citric and many other acids, and other industrial and pharmaceutical products. Carbohydrate materials must be relatively cheap in their utilization in such fields as compared to their utilization for human or even animal food. However, the industrial products have a value adequate to pay, in many cases, the competitive price for carbohydrates in such utilization.

The utilization of proteins and oils is largely in the food industry, with some notable exceptions, such as the use of drying oils in paints, resins, etc.

Almost invariably there is a chemical conversion involved which requires chemical engineering research and development to make possible the processing at an economic range of price.

The extreme cost of storage of surpluses by the Government, particularly of food materials, is an extremely wasteful and expensive part of the program, since there is no reason to believe that our farmers in the foreseeable future will not produce equivalent amounts to those produced today. Therefore, every effort should be bent to utilizing excess agricultural crops in industrial methods on an annual basis. A second axiom should be that the price supports should be gradually reduced to balance the cost which industry can afford to pay for these products in industrial uses.

Still another axiom which should be followed in our democratic economy of free enterprise is that the industrial conversion of farm crops should be done by private business rather than by the Government itself. In some cases it may be desirable or necessary to encourage an industry to be set up by some type of tax exemption or other financial arrangement with regard to the capital cost of the plant.

The actual operation of such a plant lends itself readily in many cases to private enterprise. It has already been demonstrated that private corporations can operate a plant for industrial conversion of grains, and other carbohydrate materials. For example, this was done in the manufacture of alcohol for the rubber program on the supply of raw materials, and also in the sale of finished products during the war and since, in close cooperation with Government agencies. The actual manufacturing aspects, however, were operated by private industry at a good profit to the Government, since in some cases all moneys invested were returned and full satisfaction was evidenced by the investing agency of the Government in these enterprises. One notable example of such a plant was the operation of the Government alcohol plant at Omaha, Nebr., during the war and for some years since.

There were three aspects involved: the supply of raw materials, the processing, and the disposition of products. It is suggested that some similar operation might again be set up for the processing of excess grain crops. Each of these three aspects might require some cooperation on the part of the Government departments involved. The first and most important one would be the supply of raw materials at a price which would allow their commercial processing with profit. A tremendous amount of grain surplus in the Middle West indicates, without a doubt, that, until the major aspect of our economy is changed through war or other calamity, there can be no utilization of the grain flowing into this

reservoir. This surplus increases each year, as the Government attempts to remove from the market the inevitable excess of production under modern scientific farming and the increased utilization of fertilizers.

The Federal Government seems committed to some farm support, and, if so, it will cintinue to buy millions of bushels of grain every year. There is no hope of its resale for food in this country under any conceivable peacetime economy, nor yet abroad without damaging our relations with our national competitors for the grain markets of the world. These include every agricultural nation of importance, either directly or indirectly.

The cost of storing this grain, quite aside from the capital cost of the interest on value, is tremendous, and runs from 12 to 25 cents a bushel a year. Due to inadequate and emergency storage equipment and untrained personnel, there are, inevitably, tremendous losses which probably double these cost figures.

No program has been suggested which will do other than accumulate a stockpile of deteriorating foodstuffs. This mountain grows alarmingly. Since it is impossible to sell these stores, either at home or abroad, without depressing the domestic or foreign markets of grain in its rightful role as a basic foodstuff of both man and animals, the situation resolves itself, inevitably, that the material must be used for other purposes than food, if it is not destroyed or allowed (or encouraged) to spoil.

If this point is recognized as the inevitable and only logical conclusion, the surplus then is stored longer for 1 of 2 possibilities; for a war or similar calamity which would require tremendous supplies of food from a surplus budget, or for catastrophic losses of the food being stored, often in makeshift reservoirs. In some cases, there has been some interest in disposing of other surplus product for nonfood uses, where the cost of storage was higher than that for grain. This approach should also be considered for grain. Obviously, no other usage than food can command the food price or value for grain. If such a proposal of balancing the budget of surplus grain into storage and that out of storage could be reached, the only way would be to sell large amounts at the value which could be commanded for industrial use. Thus, the first question rises: Is the owner of the surplus grain willing and able to recognize, realistically, the lower value of crop surpluses as industrial commodities and raw materials, and, if so, is it willing to sell sufficient quantities under contract so that an industrial plant can devote itself to the task of their nonfood utilization?

In the case of grains, it would seem that a round figure of at least 50 cents per bushel might be paid. This figure might even be increased somewhat under advantageous condition of a plant for conversion to alcohol, but, low as it seems compared to the purchase or support price, it is attractive compared to the costs of even a few years of storage of this same grain. Much more attractive it is than the present concept of indefinitely long storage. Thus, in considering the capacity of 1 alcohol plant, that at Omaha, there was needed, roughly, 10 million bushels of grain per year to produce roughly 25 million gallons of 190-proof alcohol. Ten million bushesl yearly is only a small part of the total surplus grain, but a mechanism which would envisage the operation of even one plant the size of the one at Omaha would be a start in the direction of industrial utilization of materials which are, basically, food products.

A minimum time of some years would have to be provided to any industry such as this, and the private contracting corporation should undertake to pay at least a minimum price, say 50 cents a bushel, for all grain offered in whatever condition of spoilage up to its total capacity. This would be a tremendous advantage in getting distressed and damaged grain off the hands of the Government purchasing agency for surplus crops, whenever such distressed and damaged grain is present.

Certainly, this price would be greater to the Government than the value, based on the Government's grain storage and spoilage cost for an indefinite number of years.

Such a contract would allow the operating company to sell distillers dried grains and solubles and, possibly, materials such as monosodium glutamate, which would be a profitable additional product to a plant operating with wheat. The byproducts of corn converted to alcohol would also be available as marker outlets. Other products of only indirect relation to food could also be considered.

The second major question would then be the obtaining of a company operating a plant of sufficient size to justify such an experiment on a major scale. A satisfactory method would probably be a minimum contract at a reasonably low rental price of some existing Government facility or someone financed by the Government. The rental price would be established, keeping in view the costs of setting the plant into operation, collection of personnel, etc., for a period of

time which could be set up, a period of time reasonable to both sides. At the same time, a contract would have to be entered into for obtaining surplus grains at some reasonably low price. There might also be some provision for sale of the plant to the purchaser at some basis agreed upon in advance. Other excess-capacity plants are also available, it is believed, in industrial hands. Also, if contracts for surplus grains were extended to 5 years and 5-year tax writeoffs were allowed, as has been done in other industries for other purposes, new plants could be built by corporations which could be encouraged to bid against each other for the surplus grain for industrial uses.

The third major problem, after the provision of the raw material and the plant, would be the marketing of the alcohol which would be produced along with other products, animal feeds, etc. This would be a responsibility in the competitive alcohol market, which, however, in almost every company involved, would be only a small part of the major petrochemical or other similar industry. Some large quantities of alcohol go to the Department of the Army for military uses; there is also the production of butadiene and synthetic rubber which might be considered.

The addition of 25 million gallons from 1 such plant per year would be only a very small percentage of the total production of alcohol in this country, and such an operation should not affect the price of alcohol.

In any case, it must be recognized that the introduction of new sources of supply of any commodity will create the usual problems of distribution in our competitive economy.

With rising alcohol consumption in increasing plants being built or considered from petroleum, the utilization of some of the farm surplus would merely delay the building of such plants; always providing that grain were made available at a price to make the alcohol competitive, when its selling price and the minor additional products were considered.

The making of monosodium glutamate and other protein products from wheat, and of corn oil, glucose, etc., from corn, would also permit additional prices or income to be realized and, hence, prices to be paid for the surplus grain.

While emphasis has been made above on grains and the possible use of surpluses of these materials in chemical industry and in chemical conversions to other food products, e. g., monosodium glutamate, a similar approach may be made through chemical engineering development programs in the case of every other agricultural commodity now being stored as surplus. It is not expected that limitless amounts of these surplus materials from farms may be used economically, even with any amount of development. It is anticipated that the skill of economist and lawmakers will reduce gradually, if not rapidly, the amounts of such materials which will have to be handled through the reduction of the dole system to this part of our national economy, by the elimination of payments to corporations engaged in farming and to nonresident farmers with other income, or by the establishment of some minimum amount of dole as has been given to other nonemployed or nonsuccessful parts of our industrial community.

As the processing of the agricultural commodities becomes more complete, to make, for example, butter and cheese, the unit price rises tremendously. In some cases also, the storage costs per year, as a fraction of the unit price, increase tremendously since refrigeration may be needed. By a suitable simple conversion, much of the butter has been sold abroad as butter oil to those countries demanding this commodity as a part of their staple diet, and it has even been possible to separate cheese into its valuable constituents of pure sweet-butter oil (without cheese flavor) and the cheese proteins. Here, the chemical engineering development work may stop and turn over to others the problem of distributing the relatively high-valued proteins and the high-valued butter oil to suitable markets or areas of the world where relief from food shortage is needed.

The use of the large amounts of cotton which can be grown but cannot be sold has also created a problem which can be solved to some extent by the chemical engineers in conversions of this valuable material for textiles into still more valuable textile fibers and into other chemical utilizations. The competitive aspect here is somewhat difficult because cotton as a source for pure cellulose has almost priced itself out of the field of competition with the developments in the manufacture of cellulose from wood. Even so, aggressive research and development programs of a scientific and chemical engineering nature would help to market a larger percentage of the cotton production in our country.

The problems in economics of chemical conversion are of course difficult because of the tremendous quantities of foodstuffs which can be made available to a surplus program and because they are always relatively high-priced commodities. On the other hand, chemicals as such would sell in the same range per pound

as foodstuffs and are usually produced in much smaller quantities. There is thus the basic economic discrepancy of further increasing value by conversion of foodstuffs and the difficulty of disposing of tremendous quantities of even higher priced resulting materials.

Vitamins, antibiotics, pharmaceuticals, etc., can all be made and are all made as high-priced chemicals from food materials; but the quantities involved or which can be utilized are very small compared to the quantities which could be made.

My hearty sympathy goes to you, Senator Curtis, in your intention to increase the number and volume of utilizations of farm materials. Certainly some of the best efforts, talent, and possibly funds, of our country should be utilized in solving this major problem of the mid-20th century with increasing chemical productivity, extension of the use of fertilizers, increased mechanization, etc., all tending to enable the farmer to produce more than all of us can eat. In the team which will solve this problem, if indeed it is solved, I predict that chemical engineers and their developments in conversions will rank high, along with inspired political leaders and economists, who will search out answers in their particular fields of human endeavor.

I am sorry that I am not able to meet with you personally in this matter. I expect to return about June 20 and if there is continuing interest in your committee, I would be pleased to add my voice and efforts to your program.

This goes with my best regards for your success therein.

Sincerely yours,

DONALD F. OTHMER,
Professor of Chemical Engineering, Head of the Department, Polytechnic Institute of Brooklyn.

STATEMENT OF DONALD M. COUNIHAN ON BEHALF OF THE AMERICAN CORN MILLERS' FEDERATION

Mr. Chairman and members of the committee, I am Donald M. Counihan of the law firm of Carretta & Counihan in Washington, D. C., and I make this statement in behalf of the American Corn Millers' Federation.

The association for which I speak is the voice of the dry-corn milling industry of our great country. The member mills are geographically distributed widely.

The dry-corn mills produce (besides the usually well-known food products of cornmeal, flour, grits, and oil) industrial products such as core binders for foundries, adhesives and binders for paper and paperboard manufacturers, and for manufacturers of gypsum board and other building materials. Also made for industry are a variety of other products for the oil industry, metallurgical industries, explosives industry, and others.

Known well to all of you is the fact that corn continues to be one of the greatest agricultural surplus problems. The 1957 crop of 3,402,832,000 bushels was well over the 3,120,484,000 bushel average of 1946–55. Yields per acre also continue to climb and the favorable outlook for the 1958 crop points toward larger and larger surpluses of corn.

Promotion of industrial uses for corn will not only help to use up these huge surpluses but will guarantee to the farmers markets for their future corn crops. We believe that because of its very desirable composition that there is no agricultural commodity whose industrial use can be expanded greater or faster than corn. With dry milling processing costs so low, the farmers' corn can reach the industrial user at an economically usable price.

The dry-corn milling industry for years has engaged in independent research to find new industrial uses for corn. Modest success has come due to these efforts but the industry and its member companies alone cannot do the job.

Early in 1957 our industry submitted to the Industrial Uses for Grain (Other Than Alcohol) Task Group, a complete statement, How To Increase the Industrial Use of Corn. A copy is attached and made a part of this statement.[1] On page 2 of this report are proposals for basic and applied research for the dry-corn milling industry which will use over 100 million bushels of corn annually. This is a sizable increase in industrial use. The balance of the report discusses the specifics of these proposals.

[1] The statement referred to is on file with the committee.

SUMMARY OF RESEARCH PROGRAM

PROPOSED BY THE DRY CORN MILLS

PROJECT	REALIZATION SCHEDULE Short • Medium • Long •	TYPE OF STIMULUS	ANNUAL USAGE OF CORN	RECOMMENDED ANNUAL APPROPRIATION
APPLIED RESEARCH				
A. CHEMICAL AND PHYSICAL				
1. Paper and Paper Products		Research	3,000,000 bu.	$ 900,000
2. Metallurgical Industries		Economic & Res.	10,000,000	900,000
3. Building Materials		Economic & Res.	25,000,000	1,600,000
4. Ceramics		Research	25,000,000	500,000
5. Water Treatment		Research	1,000,000	400,000
6. Fillers and Extenders		Research	30,000,000	400,000
7. Moisture Resistant Prod.		Research	10,000,000	500,000
8. Coal Industry		Economic & Res.	2,000,000	100,000
B. MECHANICAL				
1. Milling		Research		500,000
2. Tempering		Research		250,000
3. Selective Separation		Research		250,000
BASIC RESEARCH				
1. Genetic Studies		Research		)
2. Kernel Structure		Research		)
3. Gel Properties		Research		)
4. Protein-Starch Interaction		Research		)--- 2,000,000
5. Bran Components		Research		)
6. Trace Constituents		Research		)
7. Heat-Moisture Effects		Research		)
8. Pyrolytic Effects		Research		)
Total- - - - - - - - - - - - -			106,000,000 bu.	$8,300,000

We welcome the opportunity to endorse the principles in bills such as S. 2306, S. 724, S. 1238 and S. 3697.

We endorse and support a program of expanded research to find new industrial uses for agricultural commodities, as well as a program of incentives to encourage the expansion of such new uses. Incentives, we suggest, should be paid for new industrial uses where the new use increases the industrial consumption of the agricultural product and also only when it does not displace or reduce the current industrial use of a competing agricultural commodity.

We think it desirable to make maximum use of title I, Public Law 480 funds and wide latitude should be afforded for this use. These moneys are abundantly available and overseas scientific skills could be utilized.

The dry-corn milling industry will be happy to cooperate in a program to develop increased and additional industrial uses of agricultural commodities.

The CHAIRMAN. Will you proceed?

Senator CURTIS. I do say this: This is a businessman's job, it is an industrialist's job. It does not belong in the Department of Agriculture. Perhaps the Department of Agriculture should have something to do with it. There is a broader argument for putting it in the Department of Commerce, but I am a little bit pessimistic about existing bureaucracy of any kind, recognizing that there are some dedicated people here, but I am talking about the system.

The CHAIRMAN. Well, Senator Curtis, I would like to ask you the same question I asked Senator Capehart a while ago:

What effort have you made to get the Department of Agriculture to carry out some of the proposals that you are now advocating?

Senator CURTIS. Well, I offered the amendment to the act of 1956 setting up the Commission, which they did not support. I have conferred with them many times, and I have talked with the Secretary personally. I have no answer other than that they have to assume their defined responsibility and have no legislative authority.

The CHAIRMAN. You mean for research?

Senator CURTIS. No, I mean they have no authority to write legislation. That is our responsibility.

The CHAIRMAN. As I understand it they have sufficient authority to carry on almost unlimited research in agriculture.

All they need is money.

Senator CURTIS. Yes. Now I agree with that. I think it should go a couple of steps farther. I think this research, and some fine work has been done, I don't want to condemn everybody who works in these bureaus, some very capable, dedicated people have turned out some remarkable things at Peoria and other research stations.

What we need is a program, not only to increase research, but to utilize the private sources of research let contracts with industries,with colleges of agriculture and others to help carry the load. We also need a program of pilot testing.

If something is developed, give a concern a contract to see what they can do with it. If they have to subsidize a plant, new to our farm economy, on a pilot basis, as an educational research project that they do it and get the thing going.

When this is done it belongs to everybody.

S nator YOUNG. Will the Senator yield at that point?

The Department of Agriculture asked for some moderate increases in utilization research funds both last year and this year.

Senator CURTIS. Yes, I think this work has——

Senator YOUNG. Would you wait a minute?

The Senate side approved not the full amount but we were able to hold much of the increase in conference with the House.

So a salesmanship job on this program has to be done on the House side.

Senator CURTIS. I think that is correct, and I believe there are individuals in the Department of Agriculture who may not agree with us a hundred percent, but who have been greatly affected by the work of the Commission.

Senator JOHNSTON. The Department does not agree to this legislation, you can see why.

But at the same time they make this statement and commend the bills now pending. It says:

> Among these are authority for research grants, student fellowships, scholarships and similar aids to strengthen graduate training.

Now they claim they do not have any authority at the present time for that.

Senator CURTIS. I think this is a job for industrialists and businessmen.

Senator JOHNSTON. I agree with you.

Senator CURTIS. Plus your technical research people.

Senator JOHNSTON. I agree with that.

Senator CURTIS. And it must be done on a sound basis. If some of these things we have talked about and hoped for may prove to be impractical, there will be others along the way that will open up great opportunities.

Senator JOHNSTON. If you talk to any businessman in a big field, he will tell you he spends a great deal for research.

As quick as I introduced this bill I immediately got a letter from Bernard Baruch and he said "I think you are digging in the right direction now to help out the people who are working and toiling on the farms."

Those were his remarks.

The CHAIRMAN. All right; thank you, Senator.

Senator SYMINGTON. Mr. Chairman, I would like to ask a couple of questions, if I may.

The CHAIRMAN. Yes, Senator.

Senator SYMINGTON. Senator Curtis, with respect to Senator Capehart's concept of a Director reporting directly to the President: Do you agree with that as a better way to do it?

Senator CURTIS. My bill calls for a Board. I have no sharp disagreement in that. I would abide by whatever the committee decides. I am so anxious to see this program started that I think, as I conceive it, this Board would assign certain work to the Department of Agriculture. The Board would utilize other agencies; it would enter into contracts on trial commercialization matters.

Senator SYMINGTON. I have never known anything in Government or industry that was run right by a board, as against an individual with responsibility and authority; therefore, I am wondering if there is anything basic in your position as against that of Senator Capehart.

Senator CURTIS. No, I would not quarrel with you too much on that. I would abide by whatever is done.

Again I want to stress that my remarks which might be construed as critical of people in Government recognize a great many capable people in Federal service related to this work.

There are people of whom I am suspicious in Government and I——

Senator SYMINGTON. By the way, is this man named Jeffries or Jeffers?

Senator CURTIS. Jeffers. The rubber czar.

Senator SYMINGTON. Yes.

Senator CURTIS. Bill Jeffers, president of——

Senator SYMINGTON. I think you have it "Jeffries" in your statement.

Senator CURTIS. Yes.

Senator SYMINGTON. Just one other question: I think everybody at this table agrees that something ought to be done about this situation. I was impressed with what Senator Capehart had to say—he talked more about how to do it than whether it should be done.

As a matter of interest in the latest CCC reports it indicates that Government owned or pledged stocks of commodities are now 7.3 billion.

Of this total 4.8 billion or 65 percent of the 7.3 billion consists of 2 commodities, corn and wheat.

To me this is significant in that both of these commodities are prime targets for a research program to increase industrial use. If the Congress appropriated the money to go ahead with this thing and get it off dead center would that money go directly to the agency or the board or the director, or would it go to the Department of Agriculture to be siphoned out as they saw fit?

Senator CURTIS. Well, I am for an independent agency.

If you are singling out the Department of Agriculture I would not be too disappointed if you just put these funds, generally, in the Department of Agriculture.

As I conceive this program it is a business and industrial job as well as an agricultural job.

Senator SYMINGTON. How are business and industry going to do it inasmuch as they have done nothing in the last 30 years or so.

Regardless whether it is for business or industry or Government, if the money is going to be appropriated by the Government there has to be at least some Government supervision of the money.

Now with that premise where do you want the money to go?

You cannot appropriate $50 million to General Motors to have them look into corn.

Senator CURTIS. No, no, here is what I am seeking. I feel that the task to be done, in addition to research, is an industrial one and, therefore, the Government agency should be outside the Department of agriculture.

I think an argument can be made to put this program in the Department of Commerce, but I rather doubt the wisdom of it.

I think an independent body, whether it is an individual as Senator Capehart suggested or whether it a board——

Senator SYMINGTON. I have no further questions, Mr. Chairman. Thank you, Senator.

Senator PROXMIRE. Mr. Chairman, at this point could I take just 2 minutes of your time?

In the first place I would like to compliment both Senators Capehart and Curtis on what I think is an extremely impressive and persuasive presentation.

I just do not think there is any answer to their kind of presentation.

I would like to add that I think that the real winner in this kind of a program is going to be the American consumer. It is going to be immensely helpful to him to have more products at lower prices.

In addition, I would like to say this, with the permission of the chairman, that I particularly approve of Johnston bill, because it could open up a new industry with millions of dollars a year in northern Wisconsin.

We have hardwood up there that just is not being used, and this cold make it possible for us to use it. It is the greatest single surplus commodity in Wisconsin. We also have in Wisconsin the Forest Products Laboratory in Madison which is ready, willing, and able to do a thorough research job. Its work would fit in perfectly with this bill that Senator Johnston has proposed.

I would just like to take 1 more minute to ask the chairman if I can put into the record a statement I have prepared on this, and a letter from Mr. K. S. Dickinson, the president of the Tomahawk Pulp Co. in Wisconsin, and a telegram from Frank W. Christopherson, Jr., chairman of the industrial development committee of the Douglas County board, in northern Wisconsin, in support of the Johnston bill. Mr. Charles Stoddard will testify later today on behalf of the Douglas County board committee.

I would also like to ask, Mr. Chairman, that project R–56, on page 57 in the Welsh report, also be put into the record. It is only about 200 words long. That would be very helpful in explaining this project.

The CHAIRMAN. Wishout objection, that will be placed in the record at this point in connection with your statement.

(The material is as follows:)

STATEMENT BY SENATOR PROXMIRE—RESEARCH PILOT PLANT PAPER MILL TO UTILIZE LOW-QUALITY HARDWOODS

There is a billion-dollar natural resources in my State of Wisconsin which is providing very little in the way of jobs and income for the people of the State. Very much the same situation prevails in the neighboring States of Michigan and Minnesota.

Almost one-half of the land area of Wisconsin is covered with forest—16½ million acres of it. Of this acreage, 13½ million acres are in hardwoods, most of which are of low quality and for which there is little or no market at the present time. According to the Timber Resources Review of the United States Forest Service, only one-third of the annual growth of these hardwoods is cut at all.

This tremendous acreage of hardwood forest, covering more land in my State than its total cropland, is yielding very little income to the national economy. It provides few jobs.

But this can be changed completely by scientific discoveries made by the Forest Products Laboratory of the United States Forest Service in Madison, Wis. Research shows that low-grade hardwoods can be used for making newsprint and other types of paper.

If these new papermaking methods could be tested and proved and put into commercial operation, it would create a tremendous economic boon to many areas of the States of the upper Great Lakes region.

Senator Johnston's bill (S. 3697) would authorize a pilot plant paper mill to manufacture newsprint paper from low-grade hardwoods. Operation of such a project would open the way to a new market for this tremendous resource.

The Commission on Increased Industrial Use of Agricultural Products, a bipartisan Commission appointed by President Eisenhower pursuant to Public Law 540 enacted by the 84th Congress in 1956, lists exactly this kind of project as one that might be carried out under the legislation sponsored by Senator Johnston and other Senators. The Commission describes this proposed project as follows:

"EXCERPT FROM THE REPORT TO THE CONGRESS FROM THE COMMISSION ON INCREASED INDUSTRIAL USE OF AGRICULTURAL PRODUCTS

[S. Doc. 45, 85th Cong., 1st sess.]

"*R–56*

"*Agricultural product.*—Timber.

"*Proposed use.*—Pulp products, including newsprint.

"*The problem.*—To conduct pilot-plant studies of a new pulping process that holds promise for profitable use of hardwoods from farm woodlands in papermaking.

"*Objectives of research.*—Farm woodlands constitute an important potential source of revenue, especially from off-season work. A considerable part of the mixed hardwoods in the woodlands is not suitable for saw logs, but could be used as pulpwood for papermaking.

"The semichemical pulping process developed by the USDA has made possible the use of various species of hardwoods that were formerly considered unsuitable for papermaking. Further use of the hardwoods is being made possible by the cold soda process of pulping, which is in the advanced experimental stage. Important problems remain, however, such as improvement of continuous pulping; reuse of pulping chemicals or development of byproducts to avoid loss and stream pollution and reduce capital outlays; and increasing the variety of types of paper products that can be manufactured from hardwoods, including newsprint. This development requires a continuous pilot-plant study to extend the usefulness of the cold soda process, and laboratory and engineering research aimed at increasing the efficiency and lowering the capital requirement for this new approach to the pulping of hardwoods.

"*Relation to current or past research.*—As noted, this work is a large-scale development, expansion, and evaluation of the cold soda process developed by the USDA. The process is now in use in two large plants, but its broader applicability will require the investigation outlined."

The laboratory work for development of the new process for utilizing hardwoods in the economical manufacture of newsprint paper has been substantially completed.

The main problem remaining—beyond the finishing touches on the new methods developed through scientific research—is to give private enterprise a push into active commercial development of this potential new industry.

This bill will authorize Federal loan funds for a commercial pilot-plant paper mill to make newsprint out of these low-grade hardwoods. It could be operated by private enterprise, in conjunction with research work carried on by the Forest Products Laboratory.

At present, for example, the State of Wisconsin has about 83 million cords of hardwoods, more than half of which has no value except for pulpwood, and for which there is little or no market. Similar conditions exist in Michigan and in Minnesota.

At current prices of $12 per cord for pulpwood delivered at the mill, this represents a potential billion-dollar resource in Wisconsin that is waiting to be tapped.

Moreover, it is a renewable resource, and one of potentially increasing value. The annual growth of these low-quality hardwoods in Wisconsin alone is worth $60 million per year. If a suitable market for this timber can be provided, much of this forest could be cropped profitably and replaced with even more valuable and more productive species.

Our second-growth hardwoods are one of the Nation's greatest underdeveloped resources. These forest lands could provide many thousands of new jobs, particularly in the North, in both part-time woods work in conjunction with farming, resorts, and recreation, and full-time employment in wood-processing industries.

Developing this new newsprint industry will not compete with Wisconsin's present paper industry. No newsprint is being manufactured in Wisconsin at present.

But it would relieve publishers from recurring newsprint shortages. When supplies of newsprint become short and prices rise, it is the smaller weekly and daily publications that are squeezed hardest. They often operate on extremely narrow margins under the best of circumstances; uncertain supplies and undependable prices for their most essential raw material imposes a dangerous threat to the very survival of this extremely important sector of our free press.

A study prepared by the United States Department of Commerce for the House Committee on Interstate and Foreign Commerce, with the assistance of representatives of the paper, paperboard, and pulp industries, was published June 17, 1957. This study surveys the present capacity and demand for various types of paper and pulp products, and projects these figures to estimate the probable

market requirements, domestic production capacity, and imports, for each year up through 1965.

According to this study, the estimated annual consumption of newsprint in the United States will rise from an actual consumption in 1956 of 6,802,000 short tons to 8,250,000 short tons.

Production of newsprint by plants within the United States totaled only 1,615,000 short tons of the 6,802,000 short tons consumed within the United States in 1956. By 1965, domestic production will rise to 2,700,000 short tons. This will leave a balance of 5,700,000 short tons that will need to be imported into the United States in 1965. Total exports of newsprint are estimated at only 150,000 short tons for 1965.

In my judgment, the newsprint supply and demand situation that is anticipated in the years ahead allows considerable room for expansion of our domestic production facilities. We will be providing barely one third of our requirements for newsprint from domestic paper mills by 1965. A moderate expansion of our domestic newsprint production through commercial development of the process for making newsprint out of low-quality hardwoods, which the pilot plant project authorized by this bill would make possible, should be most beneficial from the standpoint of consumers of newsprint as well as the overall national economy.

TOMAHAWK PULP CO.,
Appleton, Wis., May 29, 1958.

Re Proposed pilot newsprint plant for use of hardwoods in northern Wisconsin.

SENATE COMMITTEE ON AGRICULTURE AND FORESTRY,
Washington, D. C.

GENTLEMEN: Wisconsin formerly was one of the leading manufacturers of newsprint. In recent years, however, because of the very high price for spruce pulpwood and the competition from lower priced raw materials in the form of Canadian spruce pulpwood from Canadian mills and southern pine by southern mills, no newsprint is currently being manufactured in Wisconsin.

Market price for peeled spruce pulpwood is approximately $45 a cord delivered as compared to $20 a cord delivered for northern hardwoods, chiefly aspen and poplar.

Northern hardwoods are now being utilized extensively in the manufacture of high-grade tissues and toweling papers by Wisconsin mills. A copy of a recent letter from the United States Department of Agriculture, Forest Service, Lake States Experimental Station, St. Paul, is attached, indicating a practically inexhaustible supply of northern hardwoods which would be available for the manufacture of newsprint paper.

The development of a newsprint industry in Wisconsin would be of great aid to all segments of the State, agriculture, labor, and industry, and it is hoped that your committee will favor Senator Proxmire's proposal for this pilot newsprint plant.

Very truly yours,

K. S. DICKINSON, *President.*

UNITED STATES DEPARTMENT OF AGRICULTURE,
FOREST SERVICE,
LAKE STATES FOREST EXPERIMENT STATION,
St. Paul, Minn., March 21, 1958.

Mr. K. S. DICKINSON,
Tomahawk Pulp Co.,
Appleton, Wis.

DEAR MR. DICKINSON: In the tables and comments below I have tried to answer the specific questions posed in your letter of March 17.

1. Present available supply of aspen and other hardwoods in the States of Wisconsin, Minnesota, and Michigan.

Net volume of hardwood growing stock in the Lake States by species group and State, 1953

[Million cords]

Species	Michigan	Minnesota	Wisconsin	Total
Aspen	22.0	23.3	21.8	67.1
Other soft hardwoods	29.7	17.1	22.2	69.0
Hard hardwoods	43.7	14.7	38.9	97.3
Total hardwoods	95.4	55.1	82.9	233.4

The above table gives the total volume of good trees on commercial forest land in all ownerships. I wouldn't say that it is all "available," in a strict sense of the word, because some is not for sale or is scattered in inoperable stands or is too large or too valuable for pulpwood. Estimates of available timber supplies can be made for local areas, using certain assumptions on prices offered, etc. Our estimates are for broad areas and include all the growing stock.

The next table gives a breakdown between pulpwood-size and sawtimber-size trees, for the Lake States.

Net volume of hardwood growing stock in the Lake States by species group and diameter class, 1953

[Million cords]

Species	Diameter at breast height class (inches)		Total
	5 to 11	11 and larger	
Aspen	56.2	10.9	67.1
Other soft hardwoods	38.8	30.2	69.0
Hard hardwoods	43.6	53.7	97.3
Total hardwoods	138.6	94.8	233.4

NOTE.—Minnesota allowable cut of aspen 1.1 million cords.

For the State of Minnesota we have computed the allowable cut of aspen, i. e., the volume that could well be cut annually during a 10-year period while maintaining or building up the growing stock. This works out to 1.1 million cords, or about 4.7 percent of standing volume. We don't have the figures yet for Wisconsin and Michigan, but this percentage might be applied to aspen volumes in these States for a rough estimate of allowable cut.

2. Present annual cut of hardwoods in these three States:

Total hardwood timber cut in the Lake States, by species group and State, 1954

[Million cords]

Species	Michigan	Minnesota	Wisconsin	Total
Aspen	0.6	0.5	0.6	1.7
All other hardwoods	1.0	.4	.9	2.3
Total hardwoods	1.6	.9	1.5	4.0

The above table shows that the annual cut of aspen in Minnesota is about half the allowable cut. The next table shows the cut for pulpwood alone. You will note that only a little more than half of the aspen cut goes into pulpwood. Other industries also use aspen.

Hardwood timber cut for pulpwood in the Lake States, by species group and State, 1954

[Million cords]

Species	Michigan	Minnesota	Wisconsin	Total
Aspen	0.399	0.250	0.344	0.993
All other hardwoods	.032	.007	.077	.116
Total hardwoods	.431	.257	.421	1.109

3. Estimated annual matured growth of hardwoods of pulpwood size.

The next table is a summary of annual growth on all good hardwood trees 5 inches and larger in diameter.

Net annual growth of hardwood growing stock in the Lake States by species group and State, 1952

[Million cords]

Species	Michigan	Minnesota	Wisconsin	Total
Aspen	1.1	2.0	1.5	4.6
Other soft hardwoods	1.4	.8	.9	3.1
Hard hardwoods	1.2	.5	1.3	3.0
Total hardwoods	3.7	3.3	3.7	10.7

It is apparent from comparing this table with the one on timber cut that for each State as a whole, hardwood growth exceeds the current cut. Figures for such broad areas of course conceal local situations where overcutting takes place. In general, with our present largely understocked stands, growth should exceed the cut if we are to build up the productivity of the stands. However, there are many areas, particularly in the aspen and oak types, where more cutting would benefit the stands.

4. Estimated length of time in years for aspen to grow to pulpwood size.

Lake States Aspen Report No. 21 (June 1947) says that on moderate sites aspen reaches the minimum pulpwood size in about 25 years. The yield at this time is very low compared to that of longer rotations. As you know, disease is a limiting factor in aspen age and even on good sites cutting is usually recommended by age 60. I understand that some pulp companies now figure on rotations of 35 or 40 years for maximum production pulpwood size material and minimum discoloration by disease organisms.

I am having mailed to you from our publications center some materials that you might find helpful in your investigations. They are:

Lake States Timber Resources, Station Paper No. 37.

A Record of the Timber Cut From Forests of the Lake States, 1954. Station Paper No. 53.

Silvical Characteristics of Quaking Aspen, Station Paper No. 49.

If we can be of further help to you please let me know.

Very truly yours,

M. B. DICKERMAN, *Director.*

SUPERIOR, WIS., *May 31, 1958.*

Senator WILLIAM PROXMIRE,
Senate Office Building, Washington, D. C.

DEAR BILL: The industrial development committee of the Douglas County Board of Supervisors endorses the Proxmire amendment to the new bill for the industrial use of agricultural products to be heard before the Agricultural and Forestry Committee of the United State Senate on Wednesday, June 4. Charles H. Stoddard has been duly authorized to act as technical consultant for our committee at the hearing. This amendment for a pilot plant using northern hardwood for newsprint greatly benefits an area which at the present time has approximately 12 percent of our total working force unemployed. This amendment if adopted would greatly aid the farmers of this area who own woodlot tracts.

FRANK W. CHRISTOPHERSON, Jr.

Senator CURTIS. Mr. Chairman, there will be a few other papers which at a later time, I would like permission to insert before the record is closed.

The CHAIRMAN. Senator, the committee will give you about a week to do that.

Senator CURTIS. Yes.

Senator CAPEHART. May I have the same right?

The CHAIRMAN, Yes.

Senator SYMINGTON. Mr. Chairman, I would like to join Senator Proxmire in commending these two gentlemen this morning.

In my opinion this may well be the most important single problem we have today with respect to the American economy.

The CHAIRMAN. Permission is granted to both Senator Curtis and Senator Capehart.

At this point in the record, the other bills on this subject will be inserted.

(The bills referred to above are as follows:)

[S. 1238, 85th Cong., 1st sess.]

A BILL To amend title II of the Agricultural Act of 1956 so as to provide for the utilization of surplus agricultural products through the use in motor fuels of alcohol manufactured from agricultural products grown on farms in the United States

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That title II of the Agricultural Act of 1956 (relating to disposal of surplus agricultural products) is amended by inserting at the end thereof a new section as follows:

"USE IN MOTOR FUELS OF ALCOHOL MANUFACTURED FROM AGRICULTURAL PRODUCTS

"SEC. 213. (a) As used in this section—

"(1) The term 'agricultural product' means any agricultural product grown on farms within the United States.

"(2) The term 'motor fuel' means any petroleum product (including gasoline, kerosene, naphtha, benzine, and crude oil) which (A) has a specific gravity of thirty-six degrees or above, Baumé scale, and (B) is suitable for use as fuel in an internal combustion engine.

"(3) The term 'United States' means the various States of the United States, the Territories of Alaska and Hawaii, and the District of Columbia.

"(b) (1) Beginning six months after the effective date of this section, it shall be unlawful for any person to sell motor fuel in interstate or foreign commerce unless at least 2 percent, by volume, of such motor fuel is alcohol manufactured from agricultural products.

"(2) Beginning eighteen months after the effective date of this section, it shall be unlawful for any person to sell motor fuel in interstate or foreign commerce unless at least 5 percent, by volume, of such motor fuel is alcohol manufactured from agricultural products.

"(3) Any person violating the provisions of paragraph (1) or (2) of this subsection shall, upon conviction thereof, be fined not more than $1,000 or imprisoned for not more than one year, or both. Each sale of motor fuel in violation of paragraph (1) or (2) of this subsection shall constitute a separate offense.

"(c) Subsection (b) of this section shall not apply to sales of motor fuel during any period prescribed in a proclamation by the President declaring that, for purposes of this section, agricultural products from which alcohol is produced are not in surplus.

"(d) This section shall take effect on the first day of the first month which begins more than ten days after the date of its enactment."

[S. 2306, 85TH Cong., 1st sess.]

A BILL To provide for the increased use of agricultural products for industrial purposes

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act may be cited as the "Agricultural Research and Industrial Act of 1957".

STATEMENT OF OBJECTIVES

SEC. 2. The purposes of this Act are to assist in stabilizing the agricultural economy of the Nation by increasing and maintaining farm incomes at levels more on a parity with those of other segments of the national economy, and by aiding in the disposition of surplus agricultural products and preventing the future accumulation of such surpluses, through programs of scientific research and development designed to find and develop new and increased industrial uses for existing agricultural products, to find and develop new products which may be more suitable for industrial use, and to encourage and assist industry in utilizing such products.

AGRICULTURAL RESEARCH AND INDUSTRIAL BOARD

SEC. 3. (a) There is hereby established in the executive branch of the Government an independent agency to be known as the Agricultural Research and Industrial Board (hereafter referred to as the "Board").

(b) The Board shall consist of five members, four of whom shall be appointed by the President by and with the advice and consent of the Senate, and one of whom shall be appointed by the Secretary of Agriculture.

Not more than three members of the Board shall be of the same political party. Two of the members shall be appointed from agriculture, two from industry, and one from science. Members of the Board shall be appointed for terms of four years, except that any member appointed to fill a vacancy occurring prior to the expiration of the term of his predecessor shall be appointed only for the remainder of such term. Each member of the Board shall receive compensation at the rate of $ per annum. The Board shall choose a chairman and a vice chairman from among its members.

(c) The Board is authorized, without regard to the civil-service laws and the Classification Act of 1949, as amended, to appoint a director and such technical and scientific personnel as may be necessary to enable it to carry out its functions, and to fix their compensation at rates not in excess of $ per annum. The Board is authorized, in accordance with the civil-service laws and the Classification Act of 1949, as amended, to appoint and fix the compensation of such other personnel as may be necessary to enable it to carry out its functions.

(d) The Board may make such expenditures (including expenditures for personal services and rent at the seat of Government and elsewhere, for law books, books of reference, and periodicals, and for printing and binding) as may be necessary to carry out its functions under this Act.

FUNCTIONS OF THE BOARD

SEC. 4. The Board shall formulate, enter into contracts and other arrangements for carrying out, and coordinate programs designed to carry out the purposes of this Act. Such programs shall include—

(1) research for the purpose of finding and developing new industrial uses for agricultural products;

(2) research for the purpose of finding and developing new crops which are better adapted to industrial use;

(3) research for the purpose of finding and developing new and improved processes for utilizing agricultural products for industrial purposes;

(4) pilot scale tests, trial commercialization, market studies, and other activities designed to bring about commercial acceptance and utilization of results of any such research;

(5) incentives necessary to encourage and enable farmers to convert to new crops developed as a result of research, and to encourage and enable industrial users to utilize new crops, processes, and uses so developed;

(6) expansion of agricultural research facilities and equipment; and

(7) activities designed to increase the supply of trained scientists available for carrying out the objectives of this Act.

POWERS OF THE BOARD

SEC. 5. For the purpose of carrying out its functions under this Act the Board is authorized—

(1) to enter into contracts or other arrangements for the performance of research and development activities, including pilot scale tests, by private corporations, nonprofit or profitmaking research organizations, State and Federal governmental agencies, land grant colleges, and other colleges and universities, and by foreign institutions, particularly in countries in which foreign currencies accruing under title I of the Agricultural Trade Development and Assistance Act (Public Law 480, Eighty-third Congress) are available for such purpose, and for the financing of such activities in whole or part with funds made available under section 7;

(2) to make loans or grants to any of the foregoing for the purpose of providing assistance in the acquisition or expansion of facilities and equipment for research or development activities under this Act;

(3) to provide technical advice and assistance to farmers and, where necessary, to make loans or payments to such farmers for the purpose of encouraging and enabling them to convert to new crops;

(4) to provide technical advice and assistance to private corporations and, where necessary, processing or other payments for the purpose of encouraging and enabling them to utilize or carry out trial commercialization of new crops, processes, and uses; and

(5) to provide research grants, student fellowships, scholarships, and similar assistance to educational institutions and to students for the purpose of assisting in the training of scientists qualified to perform services in the furtherance of the objectives of this Act.

SURPLUS AGRICULTURAL COMMODITIES

SEC. 6. (a) Upon request of the Board, the Secretary of Agriculture is authorized and directed to make available from Commodity Credit Corporation stocks—

(1) to any corporation, organization, agency, or institution engaged in research or development activities under this Act surplus agricultural commodities for use in such activities; and

(2) to any private corporation surplus agricultural commodities for use in trial commercialization of any use of such commodity or process in connection with such use.

(b) Notwithstanding any other provision of law, commodities made available under this section may be made available at such prices as may be necessary to accomplish the objectives of this Act, but the Commodity Credit Corporation shall be reimbursed for any such commodities from funds made available under section 7 in amounts which when added to such prices will be equal to Commodity Credit Corporation's investment in such commodities plus any costs incurred by the Corporation in making them available.

FINANCING

SEC. 7. (a) For the purpose of carrying out the provisions of this Act, there is hereby appropriated—

(1) for the fiscal year ending June 30, 1958, an amount equal to 5 per centum of the gross receipts from duties collected under the customs laws during the calendar year ending December 31, 1957;

(2) for the fiscal year ending June 30, 1959, an amount equal to 10 per centum of the gross receipts from duties collected under the customs laws during the calendar year ending December 31, 1958; and

(3) for the fiscal year ending June 30, 1960, and each subsequent fiscal year, an amount equal to 15 per centum of the gross receipts from duties collected under the customs laws during the period January 1 to December 31, inclusive, preceding the beginning of such fiscal year.

(b) In addition to the amount appropriated by this section for any fiscal year, there shall be available for obligation in such year the unobligated balance, not to exceed $150,000,000, of the amounts made available by this section for preceding fiscal years.

SAVING PROVISIONS

SEC. 8. (a) Nothing in this Act shall be construed to supersede or modify the existing authority of the Department of Agriculture or any other agency of the Government to carry on research activities, but the Board shall consult and cooperate with any such agency in order to prevent duplication of effort.

(b) It is the policy of the Congress that the research and development activities authorized by this Act shall be carried out by private corporations and other organizations, institutions, and agencies referred to in section 5, and it is not intended that the Board shall engage directly in research or development activities.

REPORTS

SEC. 9. The Board shall transmit to the Congress annually a detailed report of its activities under this Act, together with its recommendations concerning any additional legislation necessary more effectively to accomplish the objectives of this Act.

[S. 3215, 85th Cong., 2d sess.]

A BILL To provide for the industrial utilization of agricultural products, and for other purposes

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That (a) there is hereby established in the Department of Agriculture an agency to be known as the "Agency for Industrial Utilization of Agricultural Products" (hereinafter referred to as the "Agency").

(b) The duties and functions of such Agency shall be vested in a person who shall be known as the "Director of Industrial Utilization of Agricultural Products" (hereinafter referred to as the "Director"). Such person shall be appointed by the President, by and with the advice and consent of the Senate, and shall receive a salary of not to exceed $22,500.00.

SEC. 2. It shall be the function of the Agency to take such steps as may be necessary to bring about industrial utilization of new processes and uses developed for agricultural products.

SEC. 3. In order to assist and encourage private persons and corporations in the industrial utilization of new processes and uses developed for agricultural products, and in order to assist private persons and corporations in proving the commercial practicability of the industrial utilization of such processes and uses, the Director is authorized—

(1) to make loans and payments on such terms and conditions as he deems necessary to accomplish the purposes of this Act;

(2) to provide such technical advice and assistance as he deems appropriate;

(3) to supply surplus agricultural commodities at such prices and on such terms and conditions as he deems necessary; and

(4) to provide such other incentives as may be necessary to accomplish the purposes of this Act.

SEC. 4. (a) The Secretary of Agriculture is authorized and directed to cooperate with the Director in carrying out the purposes of this Act, and is authorized and directed to make available from Commodity Credit Corporation stocks to any private person or corporation designated by the Director such surplus agricultural commodities as the Director may specify.

(b) Notwithstanding any other provision of law, commodities made available to any private person or corporation pursuant to the provisions of this section shall be made available to such person or corporation at prices prescribed by the Director, but the Commodity Credit Corporation shall be reimbursed for any such commodities from funds appropriated to carry out the provisions of this Act in amounts which when added to such prices will be equal to Commodity Credit Corporation's investment in such commodities plus any cost incurred by the Corporation in making them available.

SEC. 5. The Director is authorized to prescribe such rules and regulations as may be necessary to carry out the provisions of this Act.

SEC. 6. There are hereby authorized to be appropriated such sums as may be necessary to carry out the provisions of this Act.

[S. 3489, 85th Cong., 2d sess.]

A BILL To provide for the conversion of surplus grain owned by the Commodity Credit Corporation into industrial alcohol for stockpiling purposes

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That (a) in order to utilize substantial amounts of surplus grain now in Government storage under the ownership of the Commodity Credit Corporation, thereby alleviating to some extent the price-depressing effect of such surplus storage; to increase the price received by the farmer as a means of bolstering the agricultural economy; to minimize losses resulting from spoilage of surplus grain; to insure that the United States will have an adequate stockpile of industrial alcohol for emergency purposes and to assist in the program of national defense, the Secretary of Agriculture is authorized and directed to convert into industrial alcohol such amounts of such surplus grain as he finds to be practical to carry out the foregoing purposes.

(b) The Secretary shall utilize such Government-owned facilities as may be available for the storage of the alcohol stockpiled under this Act and shall provide by lease, purchase, or otherwise for such other facilities as may be necessary for storage purposes.

(c) Any byproducts resulting from the manufacture of alcohol from such grain shall be utilized or disposed of in such manner as the Secretary deems appropriate.

(d) The Secretary is authorized to enter into contracts with private persons or firms for the carrying out of any part of his functions under this Act.

SEC. 2. (a) The Commodity Credit Corporation is authorized and directed to make available to the Secretary of Agriculture for the purposes of this Act such quantities of surplus grain held by it as the Secretary shall request.

(b) The Commodity Credit Corporation shall be reimbursed for any such surplus grain made available from funds appropriated to carry out the provisions of this Act in amounts equal to the Commodity Credit Corporation's investment in such grain plus any cost incurred by the Corporation in making such grain available.

SEC. 3. There are hereby authorized to be appropriated such amounts as may be necessary to carry out the provisions of this Act.

[S. 3697, 85th Cong., 2d sess.]

A BILL To create an Agricultural Research and Industrial Board; to define its powers and duties; and for other purposes

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

DECLARATION AND FINDINGS

SECTION 1. That the Congress of the United States hereby makes the following declaration and findings concerning the development of new and improved uses for farm products, for new crops to replace those now in surplus, and the disposal of surplus commodities owned by the Government:

(a) Farms in the United States have a capacity to produce more farm products than can be marketed at prices that will return sufficient incomes to farmers to maintain an efficient and progressive agricultural industry.

(b) A prosperous agriculture will contribute immensely to national welfare by efficient production of needed food, feed, and fiber by provision of raw materials for the transportation and processing industries, by purchases of production supplies, and by its contribution to maintenance of a balanced and high level national economy.

(c) National defense and security interests of the United States require protection of agricultural resources against deterioration and the maintenance of high productive capacity in order to meet possible emergency needs of the United States and other friendly nations.

(d) Basic research in agricultural products and their uses is essential in any long-range program of benefit to agriculture.

(e) Research programs to develop new and improved uses for farm products and new farm products have potentialities for providing outlets for a larger volume of farm production and greater stability of the prices of farm commodities.

(f) Public and private research agencies, including the Departments of Agriculture and Commerce, the land-grant colleges, other universities and research institutions, as well as private firms, can and should be utilized for an all-out attack on development of new and improved uses, and new and extended markets and outlets for farm products and byproducts. Research, pilot plant, development and trial commercialization work and corollary economic and related studies should be devoted to the expansion of industrial uses for agricultural commodities in surplus, and to any food and feed uses and replacement crops that can make substantial contributions toward the solution of the surplus problem. Facilities should be established as needed to permit adequate experimentation and testing and production and market development, of promising new uses and new products.

(g) Development of new and improved uses of farm products and new farm products and new and extended markets and outlets for farm products and byproducts will enlarge income opportunities for farmers. It also will reduce Government costs for acquisition, storage, and ultimate disposition of commodities now in surplus.

(h) Disposition of a portion of the surplus stocks of the Commodity Credit Corporation through industrial channels for new or byproduct uses, so that the carryover of any commodity beyond the needs of the Nation can be reduced, will have a stabilizing effect on the market prices for farm commodities.

PURPOSES

SEC. 2. The purposes of this Act are to establish a Board whose duties shall be to coordinate and expedite efforts to develop, through research, new industrial uses, and increased use under existing processes, of agricultural products; to develop new replacement crops; and to reduce the stocks of commodities owned by the Commodity Credit Corporation.

BOARD CREATED

SEC. 3. A Board is hereby created and established, to be known as the Agricultural Research and Industrial Board (hereinafter referred to as the Board), which shall be composed of five members appointed by the President, by and with the advice and consent of the Senate. Members of the Board shall be appointed for a period of four years, their terms to run concurrently. One of the members shall be designated by the President as Chairman. Not more than three members of the Board shall be of the same political party. Two of the members shall be appointed from agriculture, two from industry, and one from science. The power of removal for inefficiency, neglect of duty, or malfeasance in office shall be vested in the President. Any vacancy occurring during a four-year term may be filled in the same manner as an original appointment, but only for the unexpired term thereof.

SALARIES, EMPLOYEES, ETC.

SEC. 4. Members of the Board shall be paid compensation at the rate of $ per day. The Board is authorized to appoint and fix the compensation, without regard to the civil-service laws and the Classification Act of 1949, as amended, of a director, and such other technical, legal and other clerical employees or consultants on a salary, retainer or per diem basis as it may deem necessary: *Provided, however,* That the annual compensation of anyone so employed shall not exceed $ and the per diem allowance shall not exceed $ per day: *And provided further,* That wherever possible, in the judgment of the Board, employees of the Board shall be part of the classified civil service, and shall enter the service under such rules and regulations as may be prescribed by the Board and by the Civil Service Commission. Members of the Board and employees thereof shall be reimbursed for necessary traveling and other expenses incurred in the performance of their duties.

POWERS AND DUTIES OF THE BOARD

SEC. 5. The Board shall have power and authority, within the limits of the funds herein made available to it, to coordinate and expedite activities toward research, pilot-plant development, trial commercialization and industrial uses with Federal and State Governments, educational institutions, private research organizations, trade associations, individuals and industrial corporations in expanding the industrial utilization of the products of farm and forest and the development of new crops. In the discharge of these duties the Board is empowered to:

(a) Make use of the facilities of the Departments of Agriculture and Commerce and other Federal departments and agencies, land-grant institutions, and experiment stations;

(b) Contract with State government agencies, State and other universities and colleges, nonprofit or profitmaking research organizations, and private corporations, including agreements to share costs;

(c) Contract with foreign individuals, organizations, institutions of learning, or private corporations where payment can be made in foreign currenty accumulated under Public Law numbered 480, Eighty-third Congress, second session. The Board is hereby authorized to utilize such foreign currencies: *Provided, however,* That the authority to enter into such contracts shall be exercised only with the approval of the Secretary of State, to the end that such authority shall be exercised in such manner as is consistent with the foreign policy objectives of the United States;

(d) Provide research grants, student fellowships, scholarships, and similar aids, where deemed appropriate by the Board: *Provided,* That any such funds shall be so allocated as to strengthen graduate training in each of the four major agricultural regions;

(e) Enter into appropriate contracts for development of research results into trial commercial scale operations;

(f) Extend suitable incentives to farmers or to industry to hasten the establishment of a new crop or of a new industrial use, where such appear likely to lead to durable additional markets;

(g) Grant agricultural development certificates for the amortization of new facilities, for tax purposes, on the basis of sixty months from the date of completion of a facility in such cases as the Board deems advisable and necessary for the discharge of its duties, particularly with regard to equipment and facilities for harvesting, storing, and processing of new crops and with regard to research, development, and trial commercialization facilities for industrial utilization of the products of farm and forest. Such agricultural development certificates of rapid amortization may be issued at any time during the existence of the Board and shall otherwise be governed by the provisions of law governing emergency facilities contained in section 168 of the Internal Revenue Code of 1954 and the provisions of law governing the amortization of grain-storage facilities contained in section 169 of the Internal Revenue Code of 1954;

(h) Direct the Commodity Credit Corporation to make delivery of any of its stocks of commodities to agencies of the Government, persons, or corporations designated by the Board where such stocks are to be used for (A) research, (B) pilot plant operation, (C) trial commercialization, (D) export of manufactured products, or (E) new or byproduct uses. The Commodity Credit Corporation, with respect to commodities thus requisitioned by the Board, shall pay necessary handling and delivery charges to the destination directed by the Board. Such sums of money as the Board shall receive, if any, on such transfers of commodities, shall be turned over to the Commodity Credit Corporation;

(i) Take title to any property acquired by transfer from another Government agency pursuant to this Act or other legislative authority, or otherwise, and to make contracts or leases for the private operation of any such properties or facilities;

(j) Publicize and make available from time to time information as to the Board's activities, any discoveries through research, and applications thereof, new crops, and the development of commercial uses of the products of farm and forest;

(k) Provide in all contracts for the disposition of inventions produced thereunder in a manner calculated to protect the public interest and the equities of the individual or organization with which the contract or other arrangement is executed: *Provided, however,* That nothing herein shall be construed to authorize the Board to enter into any contractual or other arrangement inconsistent with any provision of law affecting the issuance or use of patents;

(l) Establish appropriate advisory committees to assist in effectuating specific research programs and to compensate members thereof on a per diem basis in addition to allowing traveling and subsistence expenses;

(m) Prescribe such rules and regulations as the Board deems necessary governing operations under this Act.

LIMITATION UPON BOARD POWERS

SEC. 6. The Board shall not directly conduct research, operate plants or processes or otherwise engage in business.

TRANSFER OF GOVERNMENT PLANTS

SEC. 7. (a) Notwithstanding any other provision of law, the Administrator of the General Services Administration is authorized and directed to transfer to the Board the Government-owned alcohol-producing facility at Omaha, Nebraska, known as Plancor Numbered 1608, for use in the program authorized by this Act.

(b) Notwithstanding any other provision of law, the Federal Facilities Corporation is authorized and directed to transfer to the Board the alcohol-butadiene plant at Louisville, Kentucky, known as Plancor Numbered 1207, for use in the program authorized by this Act.

(c) Notwithstanding any other provision of law, any Government agency holding any Government-owned facility useful in the program authorized by this Act is authorized to transfer such facility to the Board, for use in the program, if requested to do so by the Board, provided such transfer has the approval of the Director of the Bureau of the Budget.

(d) The Board is authorized to exercise, with respect to the facilities transferred under this section, all the authority vested in the agencies which so transferred such facilities. At the time of such transfer, funds and personnel related to the operation or administration of such facilities shall, with the approval of the Director of the Bureau of the Budget, also be transferred to the Board.

APPROPRIATIONS

SEC. 8. There is hereby appropriated for each fiscal year beginning with the fiscal year ending June 30, 1958, an amount equal to 15 per centum of the gross receipts from duties collected under the customs laws during the period January 1 to December 31, both inclusive, preceding the beginning of each such fiscal year. Such funds shall be available to the Board to provide for its operation and the expenditures and incentives herein authorized. The sums appropriated herein shall, notwithstanding the provisions of any other law, continue to remain available for the purposes of this section until expended; but any excess of the amount remaining unexpended at the end of any fiscal year over $150,000,000 shall, in the same manner as though it had been appropriated for the Board for such fiscal year, be subject to the provisions of section 3690 of the Revised Statutes (31 U. S. C. 712) and section 5 of the Act entitled "An Act making appropriations for the legislative, executive, and judicial expenses of the Government for the year ending June thirtieth, eighteen hundred and seventy-five and for other purposes."

ANNUAL REPORT

SEC. 9. The Board shall make an annual report to the Congress as soon as practicable after the 1st day of January in each year.

DISPOSITION OF PRESIDENT'S COMMISSION FILES

SEC. 10. All files and records of the bipartisan Commission on Increased Industrial Use of Agricultural Products, created by section 209 of Public Law Numbered 540, Eighty-fourth Congress, shall, upon the termination of its activities be turned over to the Board.

The CHAIRMAN. Off the record.

(Discussion off the record.)

The CHAIRMAN. As I have just indicated, ladies and gentlemen, we are privileged by having visitors from Finland.

Dr. Englund, will you give your name in full for the record and introduce our guests?

Mr. ENGLUND. My name is Eric Englund, I am an ex-agricultural attaché, in the service of the United States Department of Agriculture for 33 years, and I have the privilege of serving as guide to this Finnish group during their visit here.

Mr. Chairman, I should like first of all to introduce Dr. Annila, who is chairman of the Finnish group. [Applause.]

Mr. Kareoja. [Applause.]

Mr. Setalla. [Applause.]

Dr. Reinikainen. [Applause.]

Dr. Harma. [Applause.]

Dr. Harma is a graduate of our own Cornell University. He is fluent in English, Finnish, and Swedish. How many other languages, I do not know.

And lastly, I would like to introduce Mr. Llmarinen. [Applause.]

The CHAIRMAN. Thank you very much, Dr. Englund.

We are glad to have you gentlemen present. I wish to say that the committee is now in the process of holding hearings on 2 or 3 bills that deal with a scientific study and research program for the purpose of increasing industrial uses for our farm products. We have so many farm products here in the United States that we do not know what to do with them. We will try to find uses for them. This committee is in the process of studying the possibility of creating a board, or some such group to handle this in the future.

All right.

Senator MUNDT. Mr. Chairman, I would like to also express my appreciation to Senators Capehart and Curtis for their work in this field, their persistence in these projects, and the testimony.

And at this point in the record, I would like to have inserted a study made by the Library of Congress in connection with S. 1238, the bill introduced by Senator Young and myself dealing with the use of surplus agricultural products in motor fuels. They have prepared a special study of that which I would like to have included in the record at this point.

The CHAIRMAN. Without objection, it is so ordered.

(The document referred to is as follows:)

THE CASE FOR POWER ALCOHOL

This report was prepared by the Science Division of the Library of Congress in response to the specific request made by Senator Karl E. Mundt to develop informational material which would tend to refute statements contained in the report made by the Commission on Increased Industrial Use of Agricultural Products (pursuant to Public Law 540, 84th Cong.; S. Doc. No. 45, 85th Cong., 1st sess.).

The report is essentially a literature review, and deals with the favorable technological and economic facets of power-alcohol utilization but does not treat the unfavorable aspects. No claim is made that the treatment is complete or that it may not be countered by arguments presented from other points of view.

This report does not, expressly or by implication, present the opinions of the Science Division as to the merits or demerits of the legislation underlying the statements made.

JOHN SHERROD,
Chief, Science Division Library of Congress.

The purpose of this report is to provide evidence, based on a study of the literature, which will furnish encouragement for believing that, in the present state of knowledge and under current economic conditions, the use of power alcohol (industrial alcohol for motor fuel) can be justified.

1. HISTORY

The growth of civilization is based on the utilization of natural sources of energy. The bulk of the world's sources of energy (99 percent) is derived from energy radiated from the sun. Of this, 93 percent is irreplaceable, being the accumulations of solar energy over millions of years, and consolidated in the form of coal and petroleum. Only about 6 percent of the annual consumption of energy is derived from the present-day solar radiations, and, therefore, renewable each year. Solid fuels, such as coal, are inconvenient in use and must be supplanted by liquid fuels, even at a greater cost. Of these liquid fuels, ethyl alcohol (ethanol or grain alcohol) possesses many desirable characteristics. Most important of all, it is readily obtainable in unlimited quantities from vegetable matter available the world over, and is, therefore, renewable annually, no matter at what rate it is consumed.

Ethyl alcohol has been used as a motor fuel since before 1890, when a high-compression tractor engine was designed, considerably more efficient than contemporary engines operating on kerosene. Its low heat value prevented any extensive use of it until after World War I, when the importance of detonation and its relation to compression ratio and the nature of fuels was brought out. Even then, its use was limited to high-output racing engines, for the gasoline available were adapted to the comparatively low compression ratios then used.

However, by 1933, the increasing demand for higher antiknock fuels than were then available, together with the perfection of the processes for the production of anhydrous alcohol, previously an expensive chemical, made its use possible. The importance of the internal-combustion engine as a means of providing power is growing rapidly. In 1900, there were, perhaps, 10,000 motor vehicles in the world. By 1910, there were 500,000; by 1920, 10 million; by 1930, 35 million; and by 1953 some 56 million were registered alone in the United States.

To conclude, although solid fuels may continue to hold first place in the production of energy, liquid fuels—and especially those for use in internal combustion engines—are far more suitable for universal use, and will, eventually, supplant

the solid fuel for medium and small units. The largest plants, those for the production of electricity, will probably be hydroelectric or based on the underground combustion of solid fuels, or on the application of atomic energy.

2. Crops for Alcohol Production

The concept of using farm waste products or other vegetation as a direct or indirect source of alcohol for use in motor fuel received much attention throughout the world during the period following World War I. The principal countries in which large-scale trials of alcohol thus derived were conducted were Germany, Italy, France, and Cuba. Other countries experimented with alcohol fuels, although the alcohol was not necessarily of farm origin.

The United States historically, has been the one country which presented the most favorable basic situation for possible successful use of the idea. Of all the countries in the world, the United States had the greatest realizable potential of agricultural production, due to the large land areas under cultivation, the diversity and amounts of suitable crops—particularly cereal or carbohydrate crops; the advanced state of mechanized farming; and the rather consistant similarity of farming practices over all areas, despite geographical location. The production of the principal crops from which alcohol might be derived more economically was concentrated in specific areas, usually on terrain permitting large-scale production and mechanized practices. In most years, there was some overproduction, so that crop surpluses ordinarily existed. A vast system of intensive research on agricultural practices and problems had been created, operating under the National Government, or coordinated therewith. The United States also had the greatest development in the use of internal-combustion engines, and, therefore, had the greatest demand for fuels. It also had the largest and best equipped alcohol-producing industry in the world.

But, despite all these favorable conditions, the use of alcohol for motor fuel never attained any significance on a national scale, and attracted little public attention except in certain limited agricultural areas for a brief period. The answer to this anomaly lies in two words—"petroleum" and "economics."

In recent years, changes in the situation have occurred. The United States economy has been burdened by the effect of several wars, which have brought about an intensification of agricultural production and the consumption of vast amounts of petroleum, depleting the national "below ground" reserves. An expansion of the alcohol production has also been effected, in part, to provide for the manufacture of synthetic rubber. Seemingly, the factors favoring the use of fuels from agricultural raw materials, theoretically, have become more advantageous. The criterion of possible use of alcohol as fuel depends upon its cost and availability. Cost is primarily a matter of raw material, which may represent as much as 80 percent of the total alcohol cost before marketing. Therefore, a study of the raw-material availability must be made in any power-alcohol proposal.

The principal carbohydrate source crops in the United States are corn (maize), grain sorghum (milo), wheat, rye, barley, potatoes, and molasses (sugarcane and sugar beet are used wholly for sugar production). Fruit is used to a small extent, but principally for beverage-alcohol production. Most of the molasses is imported, since domestic molasses ordinarily finds primary use in stock feed. Only corn, grain sorghum, and potatoes ordinarily have much surplus annually available over feed or food requirements. Barley is principally used as malt. Oats and wheat are almost never used industrially.

The corn crop is the principal one used industrially, but such use ordinarily amounts to only about 6 million tons for starch, glucose, alcohol, and beverage production. This ordinarily is less than 7.5 percent of the total crop. Corn usually has carryover stocks of about the same amount. These stocks serve to cushion the market against severe price fluctuations.

Thus power alcohol production would be based largely on the cereal crops, although certain other crops (fruits, beets, potatoes) might find some utilization at times. Certain culls, wastes, or low-grade materials might be used also to a lesser and uncertain extent. The program might be set up merely as a scavenger-type industry, producing such amounts of alcohol as might be obtainable from surplus or wasting crops from year to year, or it might visualize the growing of crops specifically for industrial use, or some combination of the two methods.

Some idea of the magnitude of the fuel-alcohol problem is shown by the following estimates: assuming that 15 percent of any carbohydrate food crop normally represents culls, surplus, and waste which might become available, and that it were possible to collect and process successfully all this material, the alcohol obtainable from all the grain, fruit, and other carbohydrate crop surpluses and

wastes (22 crops in 1935, as representing a normal year) may be estimated as about 1,650 million gallons. Therefore, the alcohol potentially produced from such vast amounts of raw material would represent only about 6 percent of the volume of gasoline used throughout the country as motor fuel.

As far as industrial crops are concerned, if corn alone were used as a raw material, for example, approximately 1 billion bushels, or more than one-third of a normal crop, would be required to make the alcohol necessary for replacing one-tenth of the gasoline annually used.

The production of alcohol from farm products, therefore, might have as objective either (1) the recovery of all possible values from materials not economically utilized at present, or (2) the stabilization of crop prices. Approached from a basis of an alcohol program for the benefit of agriculture only, it appears that the production of alcohol in large quantities would not be necessary to attain program results. Particularly, crop price stabilization might be achieved by mere removal of cash grain surpluses, perhaps 300 million bushels for any particular cereal crop

3. Technology of Power Alcohol

Motor fuel constitutes a potential use for alcohol, and is the only large-scale industrial outlet which could consume grains in the tremendous quantities that are in surplus. Technologically, no great difficulties in the application of alcohol as a motor fuel are anticipated. Foreign experience in many countries has demonstrated the general feasibility of such use.

Alcohol might be used to develop engine power as a straight fuel, as a blend with gasoline, or as an extra fuel injected by use of a special device during periods of heavy load to secure improvement in the functioning of the engine. Each of these uses will be considered in detail.

A. ALCOHOL AS A STRAIGHT FUEL

From a technological standpoint, the differences between alcohol and other motor fuels are very slight. Research has established that alcohol is a good fuel and, if used properly, it performs as well as other fuels. Some investigators have found alcohol preferable to ordinary motor fuel; others have not. A major reason for these differences is that investigators have run their tests under varying conditions. Data secured can be interpreted ambiguously by the layman.

According to Jacobs and Newton, the actual power and mileage output of an engine is the result of such variables as compression, carburetor setting, spark adjustments, engine temperature, volatility of fuel, rate of forward motion, and design, all of which are complicated by traffic conditions, methods of driving, head or tailwinds, weight of car, tire traction, road composition and grade, and other uncontrollable factors. A summation result is reached as these various factors combine. Since commercial motor fuels are not stadardized in composition and since the various makes of cars use different designs and sizes of engines, different carburetion systems, and various degrees of compression, the overall power production from ordinary motor fuel varies, not only between the various makes of car, but also between the various trade motor fuels of the customary type. This variation is no doubt as great as the variation that would result from the use of alcohol. Jacobs and Newton state that future designs for automotive engines with higher compression ratios, which use alcohol to a better advantage than ordinary motor fuel, will probably eliminate the slightly higher fuel consumption of the alcohol in the present-day automotive engines.

Alcohol has a lower heating value (i. e., energy) than ordinary motor fuel—only 81,900 B. t. u. per gallon compared with 136,500 B. t. u. (average) per gallon. But, it cannot be emphasized too strongly that the heat value of a volatile liquid fuel bears no relation whatever to the power output obtainable from the fuel. The extent to which that heating value is utilized is the important thing. Present-day automobile engines convert less than a quarter of the energy in motor fuel into useful work. (They have less than 25 percent thermal efficiency.) Alcohol has a higher thermal efficiency than ordinary motor fuel. From experiments using 95 percent alcohol as a fuel for motors, it was found that the energy included in alcohol is better consumed during the combustion in the engine than in the case of customary fuel. The coefficient of useful action of a fuel depends upon the amount of calories in the given fuel which can be transferred into useful work.

During the combustion of ordinary fuel in the cylinder, large amounts of products of incomplete combustion are formed. Thus, some of the fuel is incompletely used. In connection with this fact, the motor usually pumps a working mixture poorer in air than would be theoretically expected. This incomplete

character of combusion causes the formation of residues, lowers viscosity of lubricating oils, and influences the composition of exhaust gases. Because of the more nearly complete combustion of alcohol fuels, there is a decrease in the formation of residues; lubricating oils are not made less viscous by the dissolved intermediary products; and there is a considerable saving of time for cleaning and overhauling the motor.

Statistics show that the number of fires during storage and transportation is much smaller for alcohol than for ordinary fuel because of the greater volatility and lower flash point of ordinary fuel.

When running on alcohol fuels, engine temperatures are usually lower than when running on customary motor fuel. This is mainly because the higher latent heats of the alcohol give a lower induction-stroke temperature and, consequently, a slightly lower average temperature over the whole cycle, but the lower flame temperatures of alcohol fuels also play a part. In the case of 95 percent ethyl alcohol, Ricardo has shown that the temperature at the end of compression is about 70° C. (158° F.) lower than in the case of customary fuel, while the maximum flame temperature attained will be approximately 107° C. (225° F.) lower. Consequently, the transfer of heat to the cooling water is substantially reduced. The reduction in cooling water temperature experienced when running on alcohol may be an advantage or a disadvantage, depending upon circumstances. Thus, in hot summer weather, a lower radiator temperature is to be desired, especially in hilly country. In winter weather, however, it may decrease the ease of engine starting and warmup.

The compression ratio of a motor is the ratio between the total volume within the cylinder when the piston is completely down and when it is completely up. If the volume in the cylinder when the piston is down is 4 times the volume when the piston is up, the ratio is 4 to 1. Ethyl alcohol as fuel permits a higher compression ratio for maximum power than does straight motor fuel of the usual type. Recent designs of engines tend toward a higher compression. In the United States, the compression ratio had risen to 6.4 in 1940 from 4.4 in 1925 in passenger automobile engines. In this respect, engine design and alcohol as a motor fuel are in direct relation to each other.

The antiknock quality of motor fuel is measured by what is called the octane number or octane rating. The higher the octane rating, the less the knock. Octane rating is defined as the percent by volume of iso-octane in a heptane-iso-octane mixture, which exactly matches in antidetonating property an actual fuel in a standard test engine at standard conditions. Alcohol is noted for its high antiknock characteristic which has, in fact, been recognized as its chief asset as a motor fuel. The octane number of pure ethyl alcohol is about 90 (on the basis of present test methods), while that of ordinary motor fuel varies from about 80 for the first grade, about 75 for the second grade, and usually from 65 to 68 for the third grade.

If alcohol fuels are used in a motor that has been running on ordinary fuel for a considerable period, choked filters and carburetor jets may cause trouble because alcohol is a good solvent for the resins deposited from the motor fuel in the system, and it is effective in loosening the rust deposits from the inside surfaces of tanks and fuel lines. The difficulty, however, can be avoided completely by thoroughly cleaning out the fuel system before alcohol is used, and it will never occur unless straight ordinary-type motor fuel is used again.

The solvent action of alcohol upon lacquers and shellacs resulting in blemished automobile finishes is a danger than can hardly be avoided. The new resins, however, now being manufactured for automobile finishes, are less soluble in alcohol than the previously used lacquers. Spar top varnish of Bakelite 2754 composition could be used satisfactorily. The use of antifreeze solutions, which are very concentrated, has presented the same danger, but has given rise to no serious complaints.

In experiments on corrosive properties of ethyl alcohol, Irisov found that absolute alcohol positively has no corrosive action; water and alcohol is a corrosive mixture; 95 percent ethyl alcohol acts weakly on lead and aluminum; whereas, copper, iron, and letten (iron plate covered with tin) are left intact. There is danger of corrosion of brass in the engine because of electrolytic action and the presence of metallic couples. Alcohol-air mixtures, however, normally are no more corrosive than the corresponding hydrocarbon-air mixtures. The products of incomplete combustion are definitely the worst offenders. Since alcohol is more completely consumed than ordinary fuel and since the intermediary combustion products are fewer, it follows that the exhaust gases from alcohol are less corrosive than those from other fuel. This point has been confirmed by Irosov in road tests.

One of the greatest corrosive offenders from the exhaust of customary fuel is sulfur dioxide, none of which is present in exhausts from alcohol.

Complaints from corrosion in earlier years may have been because of the corrosive action of particular denaturants.

In conclusion, alcohol may be used satisfactorily as a fuel in any ordinary engine after changes have been made in the engine. All experimental evidence has shown that modern tractors can easily utilize all fuels without any radical changes. The power of the diesel engine on alcohol (90 percent) has been found to be slightly higher than on kerosene, and the expenditure of fuel is lower. Investigations in which alcohol was used as the principal fuel in high-speed diesel engines have shown that up to 93 percent of the total fuel requirements can be inducted into a direct injection engine, in conjunction with different vegetable oils. Operation of a diesel engine with induction of alcohol leads to lesser combustion chamber deposits, reduces the smoke density and exhaust temperature, and increases the thermal efficiency under certain conditions.

B. ALCOHOL AS A BLEND

The use of gasoline-alcohol blends as fuel for internal-combustion engines is basically not a technological problem but rather an economic one. The technological aspects of this question have been thoroughly worked out, and there exists a vast amount of literature and data which has accumulated during the last decades. Therefore, it is more appropriate to consider in general terms only those technical aspects of blends which have been attacked by some, rather than to consider also those which have been generally accepted by both proponents and opponents.

Startability and vapor lock

Alcohol fuels have been attacked on the grounds that they provide poor startability at low temperatures and vapor lock at high. Neither of these statements is true, for they are based upon an error. In fact, alcohol in the proportions normally used has little effect upon startability and vapor lock, which are functions of the basic gasoline in the blend. The origin of the error is interesting. Vapor lock is measured by vapor pressure, and the normal method for the determination of this characteristic is by the Reid bomb. A standard volume of spirit is shaken with 4 times its volume of air at 100° F., and the final pressure, corrected for the water vapor present, is taken as the vapor pressure. But the method demands the presence of water in the initial stages, and this amount of water is sufficient to cause a normal alcohol blend to separate into two phases. As it happens, the vapor pressure of an alcohol-gasoline blend is higher than the sum of the partial pressures of the two phases, so that the unwary experimenter records a lower vapor pressure than the blend would give.

When vapor-lock tests are made, and 2 fuels are compared, 1 a gasoline and the other an alcohol-gasoline blend of apparently similar vapor pressure, it follows that the latter shows a greater tendency to cause vapor locking, and it is on such grounds that the claim has been made. When the true vapor pressures are compared, however, the alcohol blend has a higher value and could be expected to show a greater tendency to vapor lock. If now the tests are repeated using fuels of equal vapor pressure, no difference in vapor-locking tendency can be found. The effect is recognized in the standard method for the determination of vapor pressure where the use of a dry bomb is recommended, thus preventing the separation of the alcohol blend into two layers.

Perhaps the only foundation for complaint in startability tests refers to the warming-up period. Owing to the higher latent heat of ethanol, the induction temperature is lower than that found with gasoline, and in winter this tends to reduce the power output from a cold engine. With normal induction heating, the effect is slight and of short duration.

Many other differences have been reported between gasoline and alcohol-gasoline blends in an engine, but the effects are either so slight or so dependent upon chance conditions, that there seems little point in enlarging upon them here. The facts may be found in published works. This section can best be concluded by a question from Hubendick, head of the Swedish Government's fuel agency, when be reported the results of 10 years' operation of the official Swedish alcohol fuel Lattbentyl: "The public are unaware that the alcohol blend they are using is in any way different from normal gasoline."

Water tolerance

Anhydrous alcohol is miscible in all proportions with gasoline and will remain mixed down to very low temperatures. It is similarly miscible with water but, of course, gasoline and water do not mix except in very minute quantities. Resulting from a combination of these circumstances, the introduction of water over a certain amount into a power alcohol-gasoline blend will cause separation of the 2 constituents into different phases, the lower 1 being mostly ethanol and water and the upper largely hydrocarbon. This feature can be a troublesome one and considerations arising from it enter into a number of aspects associated with the blending and use of power alcohol. Obviously, from all points of view, every care must be taken to prevent such separation, and therefore a standard method has been adopted to determine what may be called the safety factor of any blend, and this is known as its water tolerance. The amount of water necessary to cause separation will depend on three things—the strength of the power alcohol used to make the blend, the percentage in the blend, and temperature.

It is assumed that the ethanol used would be supplied to a definite specification, and in any case this is most desirable. Its water content should not be more than 0.6 percent by weight, which for our present purpose can be regarded as a constant. This being accepted then the amount of additional water that causes the blend to go cloudy at 60° F.—a phenomenon that occurs just before layering takes place, is the water tolerance of the blend. Thus a 15-percent blend will have a water tolerance of around 0.5 to 0.6 percent by volume at the temperature stated. The effect of a drop in temperature is to reduce the water tolerance and such a blend at 32° F. would have a tolerance of about 0.4 to 0.45 percent. Larger percentages of alcohol in the blend have the effect of increasing water tolerance and smaller ones the reverse. It should perhaps be mentioned here that blends made with cracked gasoline as a rule have a somewhat greater water tolerance than when straight run gasoline is used.

In commercial practice, fuels are blended to a water tolerance of about 0.5 to 0.6 percent and subject to reasonable precautions being taken, little trouble need be expected due to separation. Once the blend is in dealer storage a water tolerance of 0.4 percent is quite safe but a drop to 0.2 percent brings it to a critical stage.

Since in most countries where power alcohol is used, the ethanol employed has to be denatured to make it undrinkable in order to free it from excise duty, it will be clear that care must be taken that any ingredients used for this purpose should be water free to avoid the strength of the ethanol being reduced.

Gum

Most readers will be familiar with the term "gum" in relation to gasoline. The formation of gum results from unsaturated hydrocarbons present in the fuel and can be said to be peculiar to cracked gasolines rather than straight ones. Two kinds of gum are involved—that already present in the fuel in solution, and another which results from further chemical reactions while in storage. We are most concerned with the latter or potential gum as it is called, and if its formation is not prevented in the fuel, serious difficulties may result in use as stuck carburetor floats and needles, inlet valves, and so on. There is a standard method of estimating this potential gum which gives us what is called an induction period as a measurement, the lower the period the more the tendency to form gum. Thus a minimum period of 240 minutes has been adopted as a standard for regular gasoline and should be used for power alcohol blends as well. The tendency for this potential gum to form can be prevented by the use of small additions of suitable inhibitors of which there are a number of proprietary makes. Typical inhibitors are based on cresylic acids and amino phenol.

The addition of power alcohol to a cracked gasoline that has already been inhibited in this way can often reduce the induction period from the standard 240 minutes down to 100 minutes, or less. It is not possible to lay down any hard and fast rule about this as gasolines from varying sources react differently. However, the induction time of the blend can again be brought up to standard quite easily at the time of manufacture by further small additions of the inhibitors.

Thus it can be safely stated that ethanol blends suitable treated are no more prone to gum formation than are regular gasolines.

Fuel consumption

Questions relating to fuel consumption are almost entirely subjective in practice. While in the laboratory proper comparative testing of fuels is relatively easy, as conditions of operation can be kept in close control, such comparisons are hardly possible when running on the road except with very elaborate facilities. Gen-

erally speaking and subject to certain small corrections, fuel consumption will be roughly in inverse proportion to respective calorific values of the fuels used.

Relating this to a 15 percent power alcohol blend it will be seen from the values already quoted that such a blend has a calorific value of some 5 percent less than gasoline alone. However, owing to the increased cooling effect of power alcohol, engines operate at a higher volumetric efficiency and this gives increased power. This has practical advantages on the road such as being able to use a higher gear longer than would otherwise be the case, leading to an economy in the amounts of fuel used. While claims have been made to the effect that power alcohol blends show better consumption than regular gasoline on production engines, be that as it may, it can be safely stated that they are no worse. Incidentally 15–17.5 percent blends represent the optimum amounts of power alchohol for such results to be obtained. Higher percentages when used in standard engines, show a greater consumption rate due to the decreasing calorific value of the blend.

Crankcase dilution

It has been stated that the use of power alcohol leads to earlier and dangerous crankcase dilution of lubricants, eventually leading to bearing failure. This would seem to be based on the theory that any unburned fuel finding its way into the crankcase is contaminated by the water already present there due to condensation, thus causing separation of the blend and adding considerable water or a mixture of water and ethanol to the oil.

In experience with power alcohol blends this is not true and consideration of that which has already been written with regard to volatility and the boiling point of ethanol, and then related to conditions obtaining in the crankcase with the engine in operation, will provide the answer.

Cylinder wear

Much has been written with regard to increased cylinder wear as the result of using power alcohol as a fuel. However, examination will show that most of this arose from earlier investigations when only high water content ethanol was available and the technique generally not so far advanced as it is today. Such cannot be properly related to modern power alcohol blends.

Cylinder wear results from two causes. Abrasive wear and from corrosion. As to the former, apart from questions of design, reasonable wear depends on adequate and proper lubrication, and this being provided, no conclusive evidence has been advanced that power alcohol blends have any more adverse effect as compared to regular gasoline.

Turning now to the effect of corrosion, this is much more important, and undue wear can result if materials of unsuitable specification are used in preparing blends; this is referred to in greater detail in the next section dealing with corrosion.

Subject to proper precautions being taken, however, there is nothing in experience to suggest that power alcohol blends generally, cause more wear under ordinary operating conditions than other fuels.

Corrosion

Reference has already been made to the possibilities of corrosion in engine operation, and, of course, the matter is also pertinent in regard to general handling and storage. Since the same principles apply so far as power alcohol is concerned, both aspects can be dealt with under one heading.

As a general statement it can be said that good quality ethanol itself is not prone to cause corrosion, and practically all ferrous or nonferrous metals are unaffected. As an example, even the highest grades of ethanol intended for specialized use are invariably stored in plain steel.

Tests with blends of undenatured ethanol and good quality gasoline show conclusively that, used properly, there is no greater tendency to cause corrosion either in storage or in use than other fuels. It must be emphasized, however, that like any other fuels, the quality of the ingredients used to prepare power alcohol blends must be strictly controlled if trouble from corrosion is to be avoided.

From the point of view under reference, the sulfur content of gasoline and benzole if it is used, is a most important feature and should not exceed the figures laid down as standard for good quality products.

We should next consider the denaturants used in the manufacture of power alcohol, i. e., the substances added to the ethanol to free it from excise restrictions and duties usually specified by law.

Two of the materials most favored by the authorities in the past for this purpose have been pyridine and wood alcohol, which have been a source of considerable corrosion troubles. Commercial pyridine is usually a mixture of a number of substances whose quality is not defined and varies from time to time, and the

same applies to wood alcohol, both being incapable of specification in the terms necessary. It is earnestly recommended to those concerned therefore, that some other denaturants such as petroleum substances or synthetic methanol are specified in preference. Subject to the use of suitable denaturants in ethanol and gasoline to the specifications mentioned, corrosion of storage and dealer equipment by power alcohol blends will be no more than that experienced with ordinary gasoline, and this applies to the use of such blends so far as engines are concerned.

Fuel system

Standard vehicle fuel pumps of modern design, either mechanically or electrically operated, are quite satisfactory for power alcohol blends. In some of the old mechanical types, rubber coated diaphragms give trouble and these should be changed to the synthetic treated type.

Most standard types of carburetors are suitable for power alcohol blends and the settings provided for regular gasoline will usually be found satisfactory. On rare occasions where a special starting jet is provided, a size or two larger may be found to be necessary.

Standard fuel lines give no trouble, and the same applies to filters and filter bodies, also similar fittings where they are of good quality. It should be mentioned, however, that with inferior zinc-aluminum pressure castings there is a tendency to form a gelatinous corrosion product which can lead to jet and filter trouble.

While these are a rare occurrence these days, fuel tanks galvanized internally and where the coating is imperfect, cause power alcohol blends to discolor due to a slight electrolytic action between the steel and the zinc.

In very hot countries or if it is used at high altitudes, the tendency to vapor lock increases (as with gasoline). In such cases considerable improvement will result by using an electrically operated fuel pump as near as possible to the fuel tank. It is perhaps obvious but nevertheless worth pointing out that in such cases also, fuel lines should be routed as far as possible away from high temperature areas near the engine, and, of course, the exhaust. Shielding the carburetor from similar heat sources is also desirable.

Ignition

Ignition timing is almost invariably a matter of road testing and it will be usually found that power alcohol blends require a degree or two of extra advance for the best performance. Spark plugs and their gaps suitable for any particular engine when running on straight gasoline will be found equally suitable for power alcohol blends.

Valves

While blends generally operate at a somewhat lower temperature, the difference is not sufficient to affect valve clearances. The maker's standard should therefore be adhered to. Where the blend is manufactured with gasoline already treated with tetraethyl lead, the usual cylinder and valve seat deposits associated with this additive occur, thus, any special valve clearances suggested by the vehicle makers under these conditions should be adopted.

Reference has already been made to the possibility of freeing gasoline gum where blends are first used and in cases where filters are not efficient this occasionally causes trouble with stuck valves, but is a rare occurrence. The difficulty can be cured by the usual attention.

Carbon

Carbon mileages are usually higher than with straight gasoline, and the resulting deposits are often softer and more easily removed. These advantages, however, are not so significant as to be outstanding. There is one aspect of this that should be mentioned. It seems from the experience of certain writers that engines operating on blends appear to retain greater piston ring freedom.

Lubricants

Any good quality lubricant will be found satisfactory for engines operating on power alcohol blends and the same applies to various types of oil filters. There is not greater tendency to sludging under comparable conditions.

General

Standard gasket materials and fuel-line washers are not affected but the latter should be kept tighter since alcohol blends are more penetrating than straight gasoline. Modern vehicle finishings are unaffected by blends.

C. ALCOHOL AS AN EXTRA FUEL

The development of motor fuels in the United States has closely followed the developments in automobile engineering. The firms who manufacture automobiles are not connected with those who manufacture motor fuels. We ordinarily have two grades of gasoline, viz., regular and premium, the latter having a higher octane value. But the trend of automobile engineering design is toward higher and higher compression ratios, which necessitate the development of fuels with higher and higher octane numbers. This becomes a problem, since the production of higher octane gasoline from petroleum, after a certain point, becomes expensive and the total gasoline yield from a given amount of crude petroleum is reduced. Higher octane value can partly be achieved by the use of antiknock agents such as tetraethyl lead. However, the use of tetraethyl lead cannot be indefinitely extended, both on account of a shortage of lead which we have been experiencing and also on account of the hazards to which public health will be subjected. There is a present limit of 3 cubic centimeters per gallon.

These factors have necessitated a reconsideration of alcohol as a possible supplementary motor fuel, because of its high octane number. Since, however, we at no time have had sufficient alcohol to enable the use of alcohol-gasoline blends for even a small percentage of the fuel nationally used, we have gone to the idea of a dual fuel system. Developments in automobile engineering have shown that low-grade fuels, almost as low as kerosene, could be used in automobiles by the installation of a system of dual carburetors by which supplemental alcohol is automatically injected. The performance of an average medium-compression-ratio engine can normally be reasonably efficient on straight low-grade gasoline on level terrain, at light loads and low speeds. The extra power which will be needed by the automobile during climbing or acceleration is obtained by injecting alcohol into the engine, in essential amounts, thereby increasing for the moment the octane number of the fuel. Essentially by this expedient, an alcohol blend of proper (and variable) composition is supplied to the engines under load, as needed. This is accomplished by a patented device which has been recently developed. Many of these are now being installed in high compression cars, by the car owners, to secure smoother operation from available fuels. Requirements of such cars tend to exceed the top grade (high octane) gasolines ordinarily marketed.

American motor fuels as marketed now average about 83 octane (research method) for regular gasoline, and 90 octane for premium types. The octane values of base gasolines as produced at the refinery will vary, straight-run gasoline (distilled directly from the crude) usually being much lower (55 octane), gasoline from thermal cracking of crude having an intermediate value (perhaps 80), and catalytically cracked (or alkylate, polyform, hydroform, etc.) running higher (92–95). Market gasolines are blended from the several basic types and are leaded (1.6 cubic centimeters for regular grade to 2.0 cubic centimeters for premium at present). In the proportions as now produced and available, a total mixture of the leaded basic gasolines produced might average at an overall octane value suitable for operation of cars of ordinary compression ratio (below 7:1).

To produce base gasolines of higher octane value, a higher proportion of cracked material would be necessary. This would decrease the overall actual gasoline yield from a given amount of crude petroleum. Leaded refinery basic gasolines have a range of from 70 to 92 octane, the greater amount of this being toward the lower range. Car requirements vary now from 60 to 97 octane, with the trend of new cars being toward the higher values. The significance is apparent. In the higher ranges, each octane number increase is attained only at increasingly greater expense. To produce greater amounts of very high octane gasoline will use up much more crude petroleum, sacrifice total yields, and disturb present product balances. It also would require an industry expansion. So some compromise must be effected. Either the car designs will have to avoid use of very high compression levels, or some other means of attaining high octane value must be employed. Better combustion chamber design may obviate the need of high compression. The use of dual fuels, supercharging, or similar expedients also may serve to attain a more economic fuel supply.

Under ordinary driving conditions, the octane requirement of most present passenger cars is much lower than the fuel presently supplied by gasoline distributing station. The full octane value of the fuel may be required only when the operation approaches full throttle. Road load requirement of a 7:1 compression ratio, 8-cylinder, 1946 model automobile, for example, at 40 miles per hour was zero octane number in a test run, and at 65 miles per hour was only about 35 octane. In other words, the full octane value of the gasoline is utilized only

occasionally and a great theoretical waste is represented by use of fuel of higher value. Experiments with alcohol-water "injection," ("carburetion" is a better term) at the Northern Regional Research Laboratory and elsewhere have shown that such waste can be greatly reduced, since injection economically can add from 10 to 14 octane numbers as needed, to bring a lower octane gasoline up to "premium" grade quality. Present market gasolines do not have a sufficiently high octane number to insure knock-free operation of all cars, however, and owners of certain high-requirement cars (Cadillacs and others) are turning increasingly to alcohol-water injection to obtain satisfactory operation of their vehicles. Under ordinary city and country driving, consumption of a 50:50 alcohol-water mixture may range from 1 to 3 gallons per 100 gallons of gasoline, or approximately (on the average) 1 gallon of mixture for every 1,000 miles of operation. Trucks may require from 5 to 7 times that much, or more. The temperament of the driver will have considerable influence on consumption, while traffic, terrain, and other conditions will affect the performance.

Assuming that the average passenger car might consume 715 gallons of gasoline annually in moving 10,000 miles (14 miles per gallon), such car might require about 5.5 gallons of alcohol (in 50:50 mixture) annually. Therefore, if 150 million gallons of ethyl alcohol were to become available, the increased octane requirments of about 30 million cars, or an equivalent number of trucks might be met. This might represent perhaps half the present vehicles operating. Actually, many such cars would not need such proportions, but the advantage of "injection" over blending, in terms of total alcohol consumption versus total gasoline use, is obvious. Since the alcohol is used in mixture with water, the need of making anhydrous alcohol also is entirely obviated.

Experimentation on farm tractors has disclosed that, overall, the alcohol requirements (50:50 mixture) might amount to about 4 percent of the total gasoline fuel used. This average includes tractors of both high and low octane requirements (up to 8.1 compression ratios), and covers year-round operation.

Experimentation at the Northern Regional Research Laboratory has also shown that alcohol-water "injection," besides presenting gasoline economy in the manufacturing process and through possible use of higher compression ratio engines, also results in better engine operating conditions, i. e., cooler engine temperatures as well as knock suppression, and less deposits in engines by avoiding or reducing lead deposits. There is evidence also that engine wear is decreased, and that the lubrication—or lubricating oil, is not adversely affected. These advantages persist even at low temperature operation.

Since the "injectors" (or auxiliary carburetion devices) are usually made of metal combinations such as aluminum, iron, and copper, it is necessary to use suitable corrosion inhibitors to prevent clogging of the jets because of attack by the alcohol-water on the metal. Certain sulfonated oils have proved to be satisfactory when used in relatively small quantities.

In the early days of alcohol fuels, understandably perhaps, such fuels were looked upon as pirates in a field established by gasoline interests. With enlightened thinking, however, and advancing technology, such a view has changed considerably, and it is being realized that really the two are complementary. Recent developments illustrate this.

Reference has already been made to the ever continuing search for greater engine performance with increased efficiency. This means higher compression ratio and higher octane fuels to suit, and these are usually more expensive. In referring to compression ratios, however, what is usually meant is the designed ratio, but in point of fact an engine running under normal road conditions operates at a whole series of different ratios, lower than the designed one, due to the restrictive effect of the throttle. Only at or near full throttle does the maximum compression ratio come into use.

Engine designs have, in the main hitherto, only made provision for the use of one fuel at a time, and it will be apparent that due to this, such a fuel must be suitable for the maximum compression ratio. Rarely does an engine operate at full throttle, i. e., the maximum compression ratio—certainly not more than, and maybe less than, 20 percent of its operational time. Thus, to use a fuel suitable for the maximum conditions at all throttle settings is unnecessary and wasteful, since one with a lower octane rating would be quite satisfactory for the major portion of its running time.

It will be appreciated from the foregoing that the ideal arrangement would be to supply the engine with a fuel having a variable octane rating to match the changing effect of compression ratio mentioned above. This is possible by using a two-fuel system—one fuel having a high octane number and the other a

low one, and incorporating an automatic metering device that will blend the two fuels in the correct proportion to suit the varying compression pressures.

Power alcohol is tailor-made for use in this way, as it may be employed as the high octane fuel and used in conjunction with a low priced low octane gasoline as the other.

Dual fuel systems are not new. Experiments along these lines with ethanol were conducted in the midtwenties, and the results were most encouraging. However, there was not sufficient emphasis then on performance and economy to make the scheme commercially attractive. Times have changed, as exemplified by the GMC high compression engine designed for compression ratios up to 12:1 which has shown such outstanding results with the Carter dual fuel carburetor using alcohol as the high octance medium in testing out this method. Other experiments based on the injection of ethanol water mixtures having the same objective have also shown considerable promise. Both these developments are proving under practical conditions, the economics that are possible.

The commercial exploitation of such possibilities cannot be long delayed and such a development could only add to the prestige and wider use of power alcohol. As such it will be complementary to any existing power alcohol industry initiated for supplying blended fuels but since, in this application, power alcohol would be used as a straight fuel, the manufacturing, storage, and distributing processes would be considerably simplified.

4. Conclusion

Alcohol has formed the focus of as acute a controversy as cracked gasoline or leaded fuels in the past. We have referred to many of these criticisms as they applied to specific points in the technology of alcohol fuels. There is evidence of a powerful bias in operation; unfavorable reports appear to emanate consistently from sources inimical to the production of alcohol. Destructive criticism can be constructive: Attacks on cracked gasoline on the grounds of its tendency to form gum resulted in research to overcome this defect. There are many other examples that could be quoted. But the bias aroused by the use of alcohol as a motor fuel has produced results in different parts of the world that are incompatible with each other.

In general we can detect two schools of thought with regard to the use of alcohol as a motor fuel. Countries with considerable oil deposits (such as the United States) or which control the oil deposits in other lands (such as Holland) tend to produce reports antithetical to the use of fuels alternative to gasoline; countries with little or no indigenous oil tend to produce favorable reports. In both, members of opposing schools of thought may be found, for such is the spirit of controversy.

The United States produces and uses about 60 percent of all the motor fuel in the world today. Our oil industry represents a vast investment, and does not regard the incursion of an alternative fuel with favor. Despite this, and because oil is an irreplaceable capital asset, which must eventually be exhausted (although the probable life is another 100 years) considerable research has been conducted with alternative fuels, especially shale oil and oil-from-coal. Prior to World War II, the United States was subject to huge gluts of farm produce, and a chemical foundation was set up to discover means of utilizing these surpluses. The main outlet was in the establishment of a fermentation industry, with its main products ethanol and a variety of industrial solvents. During the war, with the loss of the Malayan rubber, the need for synthetic rubber became of paramount importance, and in its production alcohol from grain became an essential step. No less than 580 million gallons of ethanol was produced in 1945, of which 400 million was derived from grain. This figure shows what could be done.

The chemical foundation prior to 1940 produced an alcohol blend, called Agrol, which had a wide sale in the Farm Belt first on the grounds of self-help built up by careful advertising within the farming community, but later by appreciation of its merits. The leading proponent in this field is Christensen, who has published many papers on the subject. He claimed that a 10 percent ethanol blend with gasoline permitted the use of higher compression ratios and, therefore, higher power outputs and lower fuel consumptions. The reasons given for this improvement, apart from the increase in knock-rating were the improved thermal efficiency, due to the lower flame temperature, and to the reduction in carbon monoxide in the exhaust gas, and also to the improved volumetric efficiency, due to the higher latent heat of the fuel.

Gustave Egloff leads the antialcohol school, and in a series of papers has attempted to demolish the case for alcohol. He has stressed the danger of separa-

tion and the necessity for blending agents. He has given results of road tests with a number of cars, with fuel consumptions varying between 3 percent higher for 10 percent alcohol blends compared with straight gasoline. He maintained that alcohol blends are more prone to cause starting troubles, both at low and high temperatures, than normal gasoline. He further stated that acceleration was inferior, and that the tendency to vapor lock was greater. The various points have been examined in detail in previous sections of this report.

A far more weighty argument is that presented on economic grounds. Taking the cost of gasoline as 14 cents per United States gallon and alcohol as 47 cents per United States gallon, the 10 percent alcohol blend would cost 4 cents per United States gallon more than the gasoline alone. With a gasoline consumption in 1934 of 16,500 million gallons, this would add $634 million to the gasoline bill, and require the annual production of 1,650 million gallons of alcohol. This powerful case is spoiled by overstatement. It is not suggested that all motor fuel shall contain 10 percent alcohol. The consequent production of 1,600 million gallons of alcohol is far beyond present possibilities, although under military pressure, one-third of this quantity was produced in 1944. (However, Egloff somewhat spoils his own case by stating that the annual production of cracked gas could permit the production of 7,000 million gallons of alcohol; if only a quarter of this production could be realized from a product that is still largely used as a boiler fuel, a 10 percent blend could be produced.) While the present wide disparity in cost exists, alcohol should be used to produce a premium grade motor fuel, the demand for which is perhaps one-tenth that for commercial grade or for alcohol injection purposes; for these purposes the present alcohol production is ample, and the higher cost could be justified in the superior product.

The question of cost, too, should be investigated more closely. The use of waste farm products (and occasional surpluses), of wood waste, sulfite liquor, cracked gas, all materials in plentiful supply, and at present largely wasted has been stressed. The cost of alcohol from these sources need be no higher than 20 cents per United States gallon, and with the steadily rising cost of gasoline, the price disparity could be largely eliminated. It is believed that the United States would benefit by conserving her petroleum supplies.

It has been shown that alcohol may be used to develop engine power as a straight fuel, as a blend with gasoline, or as an extra fuel injected by use of a special device during periods of heavy load to secure improvement in the functioning of the engine. In general, the first method seems least likely of application, owing to the relatively high cost of alcohol. In the second instance, mixtures of small (5 to 10) percentages of alcohol with gasoline are more feasible since the net fuel cost is lower and the gasoline may be improved, owing to increase of knock rating or octane number effected by the alcohol. Such mixtures or blends can yield engine performance (milage, acceleration, etc.) comparable to or better than gasoline, under average conditions. Practically all the economic discussions assumed the use of such blends, until recently.

The third method may represent a further decreased fuel cost since the alcohol usually is employed in a mixture with water (50–50 to 85–15), and is used only when additional engine power is required such as is used in climbing hills or in quick acceleration. Such fuel is carried in a separate tank and used automatically only as needed. This eliminates the necessity of using alcohol with all of the gasoline consumed, as in the case when both are used as a blend. This economy is possible because of recent realization that a high-octane fuel ordinarily is not required for car operation at light loads and low speeds, or on level terrain, unless realtively high cylinder compression is used.

The relative total amounts of alcohol likely to be used in the United States assuming that all cars were operated under the respective methods, would be greatest with alcohol as a straight fuel and least by alcohol-water injection.

In summarizing it may be stated that technologically the utilization of power alcohol should present few difficulties. The economic success of power alcohol would depend upon efficiency and the applications of the latest advances and techniques developed by us and other countries.

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The CHAIRMAN. Senator Case. You may proceed, sir.

STATEMENT OF HON. FRANCIS CASE, A UNITED STATES SENATOR FROM THE STATE OF SOUTH DAKOTA

Senator CASE. It is a privilege to be here in this session of your committee both because of the presentations that have been made,

and because of the visitors you just introduced a few moments ago from Finland.

I may say in my State of South Dakota, we have several counties in which there are a considerable number of Finnish people and they are good farmers. In Butte, they are located in large part along the irrigation project, and in Harding County, they are located in what we call a prairie country with dry farming. In both cases these people of Finnish descent are some of the finest citizens we have. They are very industrious and very good farmers.

Senator MUNDT. If my colleague will yield, he should also include Hamlin County because Lake Norden, in Hamlin County, close to Minnesota, is the Finnish capital of the United States.

Senator CASE. Yes, the Finnish farmers in Hamlin County are particularly good in the production of dairy products and poultry and eggs.

Mr. Chairman, I am glad to add a few words of testimony on this matter you have before you, the legislation proposing to increase new uses for agricultural commodities. It has been my privilege to second the efforts of the distinguished Senator from Indiana, Mr. Capehart. I have been one of the cosponsors with him of various bills that he has introduced in this field.

The Senator from Nebraska, Mr. Curtis, comes in excellent tradition here. I recall one of his predecessors in the Senate, the late Ken Wherry, was tremendously interested in this field; as was also I believe, the immediate predecessor of Senator Curtis, Senator Butler. Both former Senators from Nebraska whom I have mentioned did a great deal to stimulate interest in farm chemurgy.

My interest in the industrial uses of agricultural products stems from an acquaintance with the late Dr. William J. Hale, who was with the Dow Chemical Co., and who wrote a book on farm chemurgy. It was his belief that many of our agricultural problems could be solved by developing new uses.

I was privileged to join with the Senator from Nebraska, Mr. Curtis, in supporting an amendment to the agricultural bill considered by the Senate in 1956, which became the Agricultural Act of 1956, and which provided for the creation of the Commission which was subsequently headed by Mr. Welsh, and to which reference has been previously made.

Since that report has been issued by this Commission, an unusual amount of interest has developed in our State of South Dakota on the subject of using farm products for industry.

In fact, a statewide meeting was called at Onida, S. Dak., on the 13th of December 1957. The purpose of that meeting was to organize an association with members from all the farm organizations to see how they could speed up this program.

An Associated Press story on December 14 reporting on that meeting said:

> Almost 200 farmers, businessmen, and farm organization officials answered the call to a public meeting last night to discuss what can be done to find more industrial uses for farm goods.
>
> Called by M. A. Hyde, a stock buyer of Onida, the meeting voted unanimously to name a committee to look into ways and means of spreading the organization in South Dakota and to other States as well as to examine more closely possible ways to use the surpluses.
>
> Hyde told the group, in opening the meeting, "Farmers need an organization to push for the use of farm surpluses in manufacturing and industry." Hyde told

the group the meeting was "not political nor backed by any group but was a meeting of all."

The 3 major farm organizations in the State were represented, 2 by their State presidents.

At the same meeting, South Dakota's Secretary of Agriculture Charles Bruett, spoke to the group on the possibilities of making industrial alcohol from grain, and my assistant, Harold Schuler of my State service office reviewed the first report of the Commission on Increased Industrial Uses of Agricultural Products.

Following the Commission's first report in 1957, I was so impressed on what could be done to make more farm products used in industry, that I wrote a review of the report to show how South Dakota would be affected by some of the things that have been done and some that will be done.

Now with the committee's permission, I would like to include this report as a part of my statement.

(The report referred to is as follows:)

FARM PRODUCTS FOR INDUSTRY

(A review of the Commission report on industrial uses for farm products)

(By Senator Francis Case)

Chemurgy is a fancy word meaning that science is at work in agriculture, but it may well be the most important word of our time for all of agriculture. Science, of course, has been at work for years on the farms and a lot of this work has been devoted to improving and increasing production. Science has given us increased production; now, science can help us with marketing.

Today, science is aiming its big guns at increasing the industrial uses of farm goods. General research has been going on in this area for years, but with the large surpluses existing in some commodities, the Congress in the Farm Act of 1956 asked for a complete survey of what research can do to speed the use of farm goods in industry.

Set up by an amendment to the Agriculture Act of 1956, the Commission of Increased Industrial Uses of Agriculture Products was charged with submitting an action report on finding what has been done and what can be done to increase the uses of farmers' goods.

I am glad that I had a part in creating this Commission by acting as a cosponsor with others on Senate bill 2940 (84th Congress) introduced by Senator Curtis of Nebraska. The bill was then incorporated as an amendment to the Agriculture Act of 1956 which created the Commission.

This Commission has issued its first report. Naturally, certain parts of the report will be questioned, but the possibilities of scientific research to create an industrial market for our farm goods is an eye opener.

Farmers producing for industry as well as for the Nation's food needs may be the best answer to many of the problems now facing the farmer. Farmers have demonstrated that they can produce more food than the Nation needs. A research program on new uses may find industry asking for the excess.

Our supply of raw materials such as coal, oil, and other minerals, is limited. The time may not be far distant when all of these can be substituted by goods created from products grown on the farms.

INDUSTRY SPENDS 3 PERCENT ON RESEARCH

The Commission suggested a new $100 million a year research program for improving the broad use of farm crops in such products as paper, waxes, adhesives, coatings, plastics, synthetic fibers, structural materials, industrial oils, antibiotics, waterproofing materials, improved detergents, and chemicals.

The agriculture industry now spends about $375 million on research—of which $190 million is from State and Federal Governments. This amount is small compared to the $3 billion spent by industry.

Agriculture only spends about one-half of 1 percent of the total agriculture sales, whereas industry spends 3 percent of its total sales. This proposed $100

million program would be financed as a part of the gross receipts the United States now collects in customs revenues.

For fiscal year 1958 the Federal request for agricultural research is only $16 million.

FATS LOSING SOAP MARKET

Much can be done with many of the products from the farms, but research is necessary to do it. Take the case of animal fats, for instance.

Less than 10 years ago, 80 percent of the United States production of inedible animal fats was used for soapmaking. In 1955 less than 30 percent of the 3 billion pounds produced went into soap.

Research to develop industrial uses for these fats is urgently needed. A new detergent based on fat is possible, and it is reported that fat can be used to prevent peeling of paint if research continues.

HIDES HAVE BEEN LOSING OUT

The people in the hide and skin industry in 1927, when 9 out of 10 people walked on leather, never believed that the day would come in 1957 when 7 out of 10 people would walk in shoes made of rubber or some other substitute. Now the hide and skin industry is producing 5 to 6 million hides over current needs.

Research may recover more of the market, because new types of leathers are about ready for development. Flexible leather for cold climates, plastic-coated leather, and gasoline- and oil-resistant leathers are possibilities that may restore the lost market in hides.

NEW MARKETS FOR WOOL

Wool has all of the desirable qualities for felt wicking—and, if wool could be developed to be more heat resistant, the entire annual wool clip could be used for felt wicking. Research is underway now to produce more heat-resistant qualities, and it must be continued.

Considering the growing shortage of rabbit's hair for use in making men's felt hats, the development of wool as felt would have tremendous possibilities.

Another potential to be developed from wool is wool grease. Over 200 million pounds of wool grease is scoured from wool annually. Only 5½ million pounds is recovered, and it is called lanolin.

Research must find ways to recover more of the wool grease for lanolin and for such uses as waxes, lubricants, etc.

Considering that South Dakota ranks ninth in shorn-wool production, new uses will be welcomed by the woolgrowers.

MORE USES MEANS MORE MONEY TO FARMER

Finding new uses and expanding the present uses of farmers' products will mean more income to the individual farmer.

The farmer may not get all of the benefits directly, but he will benefit indirectly because, with industry making use of waste byproducts and more products of the farms, they will be able to pay more for the goods they buy.

If research shows industry more ways in which they can use the farmers' products, it is only natural that demand will create better prices.

POULTRY AND EGG POSSIBILITIES

There is also much work that can be done in the poultry and egg field. Poultry and eggs are used exclusively for food, but, in the processing of these, over 2 billion pounds of waste and inedible material are discarded. This waste has a great potential and can be used.

Over 300 million pounds of feathers are wasted, but, through chemical modification, these can be made to be better suited for use in insulating clothing and bedding. Byproducts of poultry slaughter could yield protein material, hormones, enzymes, and other chemicals. Small-scale equipment must be developed for processing poultry wastes.

Over 100 million pounds of wasted inedible eggs and egg byproducts are available for industrial use annually.

South Dakota farm income would improve substantially if the full values of poultry production were obtainable.

USE FOR CROP RESIDUES

Crop residues, such as straw, stalks, cobs, hulls, husks, pits, and seeds, are also largely wasted. Thus, over 250 million tons of fiber product have been wasted annually.

I am sure that South Dakotans remember the familiar scene of a few years ago when hundreds of burning straw piles dotted the horizon shortly after harvest.

Newsprint and strawboard are now being made from wheat straw. These crop residues have a great future as use in paper and paperboard, where the demand in the United States is still greater than production.

New methods of pulping agriculture residues should be investigated. Straw now only contributes about 9 percent of the raw materials for container board, a use that might be expanded.

These crop residues also have many chemical possibilities which can only be discovered through broadened research.

CEREAL GRAINS MAKE PLASTICS

In South Dakota, 32 percent, about $170 million in 1956, of the farmers' cash income is from the cereal grain crops, such as wheat, corn, oats, barley, etc. They can receive more money from the same amount of bushels if the full potential of these grains is made available and used by industry. Ninety percent of plastics come from coal and petroleum, with only 10 percent coming from farm sources. The use of cereal starches for plastics is now limited because of the low water resistance and heat stability, but new types of starch suggest opportunities that should be thoroughly investigated.

Over 700,000 miles of roads will need to be repaired in the next 10 years, along with the construction of thousands of miles of new roads. A million tons of additives and modifiers, which are rubberlike products for asphalt, and moistureproof surface coatings for concrete will be needed. All these might be made from grain.

A POSSIBLE OUT FOR WHEAT

Of the billion bushels of wheat produced yearly, only about 5 million bushels are processed for starch and gluten (protein).

Gluten has a number of large-scale uses that might be developed by research, including adhesive, coating, and sizing materials in paper and textile industries; adhesives to make insecticides stick to treated surfaces.

Hormone-type weedkillers might be produced from the amino acids that make up the gluten.

Hormone-type weedkillers might be produced from the amino acids that make up the gluten.

Only about 35 percent of corn processed by wet milling now goes to nonfood use. The corn industry would like to expand this fifteenfold, and may be able to use up to 400 million bushels annually by using the starch in metallurgy, insecticides, and in paper. Ten percent of all cash farm income received in South Dakota is from corn.

High-amylose starch has been developed recently from corn. It is a very promising material for use in plastics, transparent films, and paper fibers. Already a corn fiber called Vicara is being used in the manufacturing of clothes. One of these days you may wear a rainproof jacket made from corn.

NEW CROPS FROM RESEARCH

These are some of the many possibilities which can be had from research. Developing a new use doesn't mean that it is ready for use. More research may be necessary to make it usable and profitable.

This research work has resulted in discovering many new crops—another benefit. Strange new names which someday may be commonplace are now being talked about in the testing stations.

A number of years ago, the soybean, which was introduced from the Orient, may have sounded strange to the American farmer, but today 22 million acres are planted. It is an increasing crop in South Dakota.

Farmers will soon be hearing about these names:

Bamboo, as a source of pulp for high quality paper.

Safflower, as a dry-climate thistle and a promising replacement for wheat in the plains areas. This thistle produces a fatty acid useful in production of resins, varnishes, etc.

Sesame, for new oil meal and for food and feed.

Jojoba, a wood green evergreen shrub that grows wild in California and produces a liquid wax which the United States now imports.

Guar, an annual drought-resistant legume which produces gum for paper manufacture and also feed uses.

Kenaf, which produces soft fiber which can be used for burlap, twine, and carpet yarn.

There are many new possibilities to make better use of the products from our farms. Industry is a growing giant in an expanding nation. There is no reason why the farmers can't produce raw materials for factories as well as for food for the people working in them. More research can give the farmers this opportunity.

Senator CASE. And, in conclusion, I merely wish to say that my State is vitally concerned in this matter, as, I am sure, you heard from my colleague, the senior Senator from South Dakota and member of this committee, Senator Mundt.

In addition to our congressional interest, and the State interest evidenced by the testimony of Secretary of Agriculture Bruett, our Governor, Joe Foss, at the governors conference in Florida just a week or so ago, brought up the matter, and, as reported in the South Dakota Daily Republic of Mitchell, on May 24, the Governor was reported as having suggested greater use of farm chemurgy to combat the recession.

Foss, participating in a roundtable discussion of economic conditions, said the governors should consider the possibilities of new uses for agricultural products in their industrial development programs. He pointed out greater utilization of farm products would create more jobs as well as eliminate farm surpluses.

So, Mr. Chairman, I commend you and your committee for the attention you are giving this subject. I think it is one in which you will have the support of the rank and file of the farmers, you will have the support of the governors of the several States, and I believe whatever you can produce in this field will be one of the great accomplishments credited to your work as chairman, and members of your committee as members of the committee in this Congress.

The CHAIRMAN. Thank you, Senator Case.

Any questions?

We are glad to have had you, Senator Case.

The next witnesses scheduled are Representatives Weaver, Jensen, Harvey, and Dixon. They cannot be present this morning, and permission is granted to them to file written statements within a week.

The next witness is Mr. J. Leroy Welsh.

Mr. Welsh, will you step forward, please, and identify yourself for the record?

STATEMENT OF J. LEROY WELSH, PRESIDENT, BUTLER-WELSH GRAIN CO., OMAHA, NEBR.

Mr. WELSH. My name is J. Leroy Welsh, and I am in the grain business in Omaha, Nebr., and I spent my lifetime in the Butler-Welsh Grain Co. And Senator Butler, the late Senator Butler, was one of your colleagues for many years, and, together, we spent most of our lifetime in the grain business. However, Mr. Chairman, I am appearing here as former chairman of the Commission on Increased Use of Agricultural Products, created under section 209 of Public Law 540 of the 84th Congress.

Now, in addition to being in the grain business, I also spent several years in the operation of the Government-owned industrial alcohol plant at Omaha, Nebr. That was fostered by Mr. Jeffers in the rub-

ber campaign. So we, for several years, manufactured alcohol for butadiene for the synthetic-rubber program.

Senator YOUNG. Mr. Chairman, if I could, at this point I would like to relate an interesting experience in connection with the plant that Mr. Welsh operated.

In the fall, I believe, of 1941 or 1942, we had a lot of sprout-damaged wheat, the damage went as high as 80 and some I think as high as 90 percent. Of course, the cash price of that grade of wheat immediately dropped about a third. Mr. Welsh found, through the operation of his plant that this sprouted wheat actually was better for the production of alcohol than the No. 1 wheat. They immediately started buying this wheat, and the price rose to the level of the other wheat and saved the farmers of my State a tremendous amount of money.

Mr. WELSH. That is true. And I would like to go on a little with that, because I am sure that advanced the price of the wheat in the State of North Dakota, the spring wheat crop, a minimum of 50 cents a bushel, and we found out, to our amazement, that 100 percent sprout of the wheat was providing the conversion agency that converted the starch to sugar and we got more alcohol out of the sprouted wheat than we did out of the No. 1 wheat.

Thank you, Senator Young.

I am appearing here as former Chairman of the Commission on Increased Use of Agricultural Products created under section 209 of Public Law 540, of the 84th Congress.

This law established a five-man bipartisan Commission charged with the duty of making recommendations designed to bring about the greatest practical increase in the industrial use of agricultural products, not need for human or animal consumption, including, but not limited to, use in the manufacture of rubber, industrial alcohol, motor fuels, plastics, and other products.

Now in carrying out this assignment the Commission obtained the assistance of 188 of the country's outstanding leaders in agriculture, industry, and science, drawn from a wide range of private and public agencies, a list of which appears at the end of the Commission's printed report. The 18 task groups or special committees in which they were organized represented all of the agricultural products useful or potentially useful in industry. In addition, a number of technical experts served the Commission as consultants or staff members, and the United States Department of Agriculture and other Government organizations were unstinting from the beginning in trying to help us with our task.

We found our Government laboratories, these 4 laboratories you were discussing, Mr. Chairman, along with research in expanding per-acre production carried on in our land-grant colleges for the last 25 years has enabled the American farmer to succeed so well in increasing farm production that we now consistently produce more than our economy can consume.

This has had such widespread effect on our markets and on the national economy that our Government has resorted to costly programs as you gentlemen all know of restricting land use, controlling production and disposing of surpluses, warehousing, and acquisition and so on. The success, or failure, of these programs, I leave to your judgment.

It is unlikely exports of our grains and fibers will increase in the future; rather it appears they will tend to decrease as other nations of the world become more self-sufficient.

The CHAIRMAN. Off the record.

(Discussion off the record.)

Senator JOHNSTON (presiding). You may proceed.

Mr. WELSH. We feel that in the interest of a healthy national economy agriculture should be kept at high levels of production and efficiency. If the same efficiency could be applied to industrial utilization as has been so successful in increasing production, that we could attain that goal for agriculture. In other words, that we can find the market for the surpluses, for the full production of the American farms in industry in America.

There appears to be little prospect of expanding our food or export markets, as I told you, in the coming decade to absorb the surplus production. The solution lies in a greater utilization of these surpluses in our industrial markets, and our Commission was unanimous in the belief this could be accomplished provided the necessary steps were taken to encourage such a development.

Our problem is to develop through research the means whereby industry can utilize grains in such a way as to eventually pay market prices and sell their end products in competition with synthetics.

In this connection, permit me to read you a paragraph from the Commission's report dealing with this problem (p. 96):

> During the war years the alcohol fermentation industry produced alcohol for butadiene (for the synthetic-rubber program) without regard to costs or study of byproducts.

We were instructed to make alcohol disregarding all costs.

> The Commission points out that a vigorous research program toward solving the problem of removing the protein from cereal grain prior to fermentation of starch for industrial alcohol (or prior to removal of the starch for other industrial uses) will upgrade the protein from the grain into human food.

Instead of animal food, as has been in the past.

> It seems possible that by thus increasing the recovery value of the protein the production of industrial alcohol from the remaining starch would become a by-product and possibly the cost lowered sufficiently to compete with petroleum products in the expanding synthetic rubber, paint, and plastic markets. Manufacture of alcohol and butadiene on a full-scale basis with careful study and analysis of results is desirable to determine the future economic position of grain in this industrial use.

Now, gentlemen, to accomplish the results envisioned by the Commission we need a greatly expanded program of fundamental and applied research to learn far more about the nature of agricultural raw materials and to determine what existing or new industrial products and processes might profitably use them. This work should go through the development stages of pilot-plant experiment, and trial commercialization, which must precede full commercial use. Such a program would mobilize the efforts of many scientific institutions: Private, public, State, Federal, and possibly foreign scientific studies provided for through counterpart funds under Public Law 480. And there has been some investigation made by Dr. Hilbert through the use of those funds, through Europe and Asia, in the past few months.

We need also to insure, through fellowships, scholarships, grants, and other means, the training of more scientific talent which can be

channeled into this neglected field of farm product research and development.

Senator JOHNSTON. May I interrupt right there?

That is one thing that these bills do that the Agriculture Department even claims to day they do not have the authority to do.

Mr. WELSH. That is right. If I may suggest, we have four wonderful Government laboratories that are spending most of their time in research of production, increasing production. I think they should continue in that field because they are working closely with all of our land-grant colleges and doing a perfectly marvelous job.

Now if you decide to build four more laboratories for industrial research, you must realize that you have to enter the manpower market for research men in competition with industry, and industry has such a start on the Government or anyone else today, they have, in the region of the University of Nebraska, by the way, for 12 years, and it is true of every college in the country, industry has come into our manpower area and has signed up, not only the graduates, but clear on down to signing up some of the freshmen. So it would be practically impossible for the establishment of a new series of Government laboratories to carry on industrial work for many years to come.

Senator SYMINGTON. Mr. Chairman, may I ask a question there?

Senator JOHNSTON. Proceed.

Senator SYMINGTON. Just as the Defense Department assigns work to the NACA, for example, the work could be directed along the lines Senator Capehart mentioned, under a director who would give the task to the laboratories under the Department of Agriculture?

Mr. WELSH. That is what our report recommends, Senator. And we point out, we recommend, that this agency be a separate agency, a separate agency of Government; but if the Congress chooses to put it in the Department of Agriculture, that it still remains a separate agency so they can divert to the Department of Agriculture, to our colleges, to our private industries, and I mean to our private laboratories throughout the country where the manpower is now located, and put the research in the hands of those who now have the manpower to carry on the work.

Senator SYMINGTON. You would not object to a director running it instead of a board; would you?

Mr. WELSH. No, sir, I certainly would not.

Senator SYMINGTON. Just to be sure that I have the framework under which you think this could operate, you would have a director, presumably reporting to the President, who would have the facilities of the Government that have already been built, and he would have a one-man job of getting us going on this "production for production" of agricultural products so that we can, in that way, try to solve the surplus problems. Is that right?

Mr. WELSH. That is correct, Senator, and I think he should be directly under the President, at the level of the cabinet, and that he should have authority to direct this work through all of the different lines of industry, and that he should be responsible only for his own actions.

In other words, he must stand alone, and he must produce results.

Senator SYMINGTON. And the money would be appropriated directly to him to apportion as he saw fit in the other agencies?

Mr. WELSH. That is right, or make a contract as he sees fit.

Senator SYMINGTON. Thank you, Mr. Chairman.

Senator YOUNG. Mr. Chairman, could I comment there?

Senator JOHNSTON. Proceed.

Senator YOUNG. In our last agricultural appropriation bill $5 million in counterpart funds were set aside for research in foreign countries along this line. If you had a director who was really sold on the idea, I think he might realize something out of that. Again, if you depend on a board, or someone who is not sold on the program, you might not get much benefit out of the $5 million counterpart funds which we will be spending.

Mr. WELSH. Senator, I think it is all important that this agency stand upon its own feet and be a separate agency. Whatever department the Government should put it in, it should be a separate agency and have its own account.

Senator JOHNSTON. In powers with other agencies and other establishments that might throw some light on the subject.

Senator YOUNG. You should have someone at the head of it who is really sold on the job he is doing.

Mr. WELSH. Like Mr. Jeffers. You could not find a finer person than he was for the job they gave him.

Senator YOUNG. Or Mr. Welsh. I do not know of anyone who has been more dedicated to this question than you.

Mr. WELSH. If I may proceed, in recent years, Mr. Chairman, agriculture has been researched out of many of its natural markets. Nearly half the market for natural fibers—cotton, wool, flax, silk—has been taken over by synthetic fibers. Some 65 percent of the soap has been replaced by detergents, which do not use natural fats. Much of the paint and varnish is produced by synthetics which do not use linseed and other vegetable oils. A good example is industrial alcohol—where I have spent several years of my life in its operation. In 1945, 172 million gallons of industrial alcohol were produced from grain and only 60 million gallons synthetically from petroleum. In 1956, only 10 years later, only 3 million gallons were produced from grain and 181 million gallons from petroleum.

Senator SYMINGTON. Mr. Chairman, I would like to ask Mr. Welsh if he would detail why that happened?

Mr. WELSH. It is simply because they are able to produce synthetically from petroleum products alcohol at cheaper prices than we could produce it from the high-priced grain that we are maintaining in America today. You realize, Senator, that the price of wheat in America is some 80 cents a bushel above the world market.

Senator JOHNSTON. That is an illustration you are giving, how one of the agricultural products has been, you might say, just researched out of the field.

Mr. WELSH. Entirely out of the field by a cheaper product. And I do not mean to criticize the petroleum industry, because I think we desperately need their help in solving agricultural problems.

Senator JOHNSTON. And there was probably very little done on the development of alcohol made from grains during that same period; isn't that true?

Mr. WELSH. That is right.

And my contention is that if we switch from petroleum to grains, it is all right with me if the petroleum people build all of the plants

and operate them all, and not take the business away from the petroleum industry, but simply let them substitute grain for petroleum in expanding markets of synthetic rubber and plastics, which will account for a large portion of our present increase in surplus.

Senator SYMINGTON. Dr. Welsh—we know that there are some subsidies that are given the petroleum industry. If the problem was primarily price, could you not subsidize—make it more competitive, just like you subsidize the petroleum industry to give it a chance of more profits?

Mr. WELSH. That is right. And, Senator, you have the point that I feel very strongly on: that research on this protein portion of the grain will enable us to recover a greater value from the protein value of the grain.

Senator SYMINGTON. By creating another potential source of consumption?

Mr. WELSH. That is right, which is human food.

Senator SYMINGTON. I would like to say, Doctor, I have read—I was motivated by Senator Curtis, a lot you have written on the subject, and it is all very interesting.

Mr. WELSH. You are very complimentary in calling me Dr. Welsh, but I do not have the privilege of carrying that title.

The Commission's report outlines 106 broad fields of research and development, including hundreds of product uses, that seem to promise possibilities of successful use in industry.

The Commission dealt with such products as cereal grains, cotton, oilseeds, meat and animal byproducts, tobacco, wool and mohair, dairy products, sugar, fruits, vegetables, edible tree nuts, white potatoes, poultry and eggs, crop residues, forest products, and new replacement crops.

I wonder if you gentlemen realize that when we get to tobacco, we have parts of the crop of 1958, 1957, 1956, 1955, 1954, 1953, 1952, and 1950 in our warehouses today? We have all those piled up, and we have an obligation, certainly, to take on 1959 and 1960 crops.

So, it is getting to be an impossible situation, in my opinion.

While the Commission's instructions were strictly along the line of industrial utilization of present crops in overproduction, it took the liberty of investigating and making recommendations with reference to the possibilities of new crops that might replace crops now in surplus production, as you were told by Senator Curtis, and thus provide another partial solution of the agricultural surplus problem.

There are literally hundreds of wild plants about which nothing is known regarding potential uses. An excellent example of such a development in recent years is that of soybeans.

Not many years ago, soybeans were unknown in this country. Now, they are a mainstay of farming in large areas.

We who served on the Commission believe that the longtime objective in agricultural policy must be the free and efficient utilization by farmers of their land, capital, labor, and managerial resources. Full, free, and profitable production, related to the needs of the Nation, is the ideal goal.

We were also convinced that the investment of public funds for carrying out the Commission's recommendations will return to the national economy and eventually to the Federal Treasury many times the outlay required; and that, further, the investment may

substantially reduce and may eventually help alleviate the demand for many of the current costly aids to agriculture—tremendous cost of acquisition, supervision, spoilage, warehousing, et cetera.

To bring about these results the Commission recommended the creation of a nonpartisan Agricultural Research and Industrial Board consisting of five members, to be appointed by the President by and with the advice and consent of the Senate, one of whom shall be an Assistant Secretary of Agriculture.

While designating a preference for a Board established independently of any other Government department, the Commission submitted an alternative proposal for its establishment within the Department of Agriculture should the Congress so prefer.

Senator SYMINGTON. Mr. Chairman, if Mr. Welsh will yield for just a minute, the idea was not in opposition to a Board; it was just that the Board itself would not have the authority and would be an advisory Board, and that the authority would be located in an individual.

I am sure that I would have no objection to a Board comparable to many other Boards that advise.

If I could ask the distinguished Senator from Indiana, would that meet with his approval, too?

Senator CAPEHART. Yes, I have no objection to a Board.

All I want is an independent Agency with authority and responsibility, and someone heading it with the enthusiasm and the intelligence and the push to get the job done.

Senator SYMINGTON. Thank you, Mr. Welsh.

Mr. WELSH. Senator, may I suggest our reason for recommending the Board?

We had so many different subjects in so many far-reaching areas to cover, for instance, cotton—where, actually, you need a man who is experienced in the cotton industry to represent that industry, as you need one in grain. And so we felt that five was the minimum that could cover all of these fields.

Senator SYMINGTON. But often with a Board the result is that you do not get administrative results.

Mr. WELSH. The chairman should run the Board, of course.

We recommended that 15 percent of the annual gross receipts from customs' revenues be allotted to the administrators of the industrial utilization and new crops program for carrying out the proposals herein described and that authorization should be provided whereby such funds could be carried forward in amounts not to exceed $150 million.

It is felt that continuity of funds will greatly improve the ability to plan and execute both research and followup actions.

And I think that is a very important point: that continuity of funds must be available to research people. You cannot start a program not knowing whether next year you are going to have funds to carry on that program.

Senator SYMINGTON. You state:

We recommended that 15 percent of the annual gross receipts from customs' revenues be allotted—

You mean all customs' revenues?

Mr. WELSH. All customs' revenues; yes, sir.

And there is a percentage of that, I think it is 15 percent, already directed for use of agriculture, for whatever use the Secretary may wish to use it for.

Senator YOUNG. I think there is a surplus in that fund now of around $500 million.

Mr. WELSH. That is right. It has not been used.

I shall not take the time of your committee to give the details of our report, but I trust the committee will give careful consideration to the entire 127-page report of the Commission, that is, the copy you have in front of you, which has been printed as Senate Document No. 45, 85th Congress, 1st session.

As I understand, your committee has before it specific bills to put into legislative form the recommendations of the Commission, and other bills in both the Senate and the House, which have suggestions for research and utilization of a similar nature.

I hope your committee will consider all proposals and be able to send to the Senate a bill that will embody the principles as set forth in the Commission's report.

All members of the Commission stand ready to aid your committee in any way we can be of help, although the committee's tenure has expired.

Now I want to tell you gentlemen, in closing, after this year of intensive study and the amount of time that I have spent on this problem, I am thoroughly convinced that there is no other solution to the farm problem than industrial uses of the surpluses.

Mr. Chairman, I want to thank you for the hearing and for the privilege of being asked to appear before your committee.

I will be glad to answer any questions I can.

Senator JOHNSTON. We certainly thank you for coming here and giving us this information, and also your offer to cooperate and work with us in the future in trying to work out something along this line.

We certainly appreciate it, and we are certainly thankful for the work that you have done in the past in this field.

Senator SCHOEPPEL. Mr. Chairman, I want to express my personal appreciation for the splendid work and effort that you have put forth with the other members of your committee. I have not had the opportunity of reading many of the individual references to the individual task reports.

As pointed out by Senator Curtis, I think those are most vital and important for our committee's determination.

Now, I know a number of the members of this committee have introduced bills here seeking to implement the great work of your committee and I, like you, share the general feeling that if we are going to make this work, we must find new, better, and more economical industrial uses. While I know there is a reluctance on the part of some people to move out I think it is most important that we seriously consider it during this session.

Out of these measures that are presently before this committee, I think we can come out with something constructive and practical.

Senator MUNDT. Mr. Chairman?

Senator JOHNSTON. Senator Mundt.

Senator MUNDT. Mr. Chairman, I want to congratulate LeRoy Welsh on his statement here and on the great work done by his Commission.

It was my privilege, one day, in the company of Congressman Jensen of Iowa, to appear before the Welsh Commission, and we spent the better part of the morning down there and most of the noon hour, and I can testify from personal experience as to the diligence and the enthusiasm that they demonstrated in their work.

I was very happy to have Mr. Welsh emphasize, as he has in his statement, this program of the development of commercial alcohol. We are very close to an answer to finding a way in which commercial alcohol can be utilized in motor fuel in this country.

I think the point he emphasized, this can be handled through existing petroleum companies, if necessary; there need not be any conflict between the oil industry, which has an irreplaceable natural resource available for fuel, and the agricultural industry, which has a replaceable resource, which comes into the picture every year, is important.

On Memorial Day, it was my pleasure to spend the day at Indianapolis, with Homer Capehart, Senator Capehart, who graces our committee table today, witnessing the Indianapolis special attraction down there, the Indianapolis Speedway.

I was reading the program during the races and was interested to note that the fuel that was used by these cars dashing around this track at 140 miles an hour was not gasoline; it was some chemical, and there was an asterisk by the chemical, and I have forgotten the exact name, set down a product similar to alcohol.

Now we are that close to finding an answer for the great transportation industry of this country, and a little push, a little drive, will do it.

In my own State, back during the early days of the depression, in the thirties, they sold successfully from automobile filling stations a product called Argrol, I believe, which was made by some small refineries out there, which did have this combination of alcohol and gasoline.

And the farmers bought it. Station WNAX used to broadcast it. You probably heard it down in Missouri, that is a pretty powerful station. And this is something that is not a dream, that happened, but it takes some push, it takes some drive, it takes some finishing.

I think there is no question that the final answer to the farm problem, which gets the farmer the daily price for his full crop which he must have in order to succeed permanently in this country, is in the field of finding the industrial uses for farm products.

And I believe that this committee can render a great public service by setting up this kind of commission, adequately financing it, and then keeping the prod in their back continuously for results.

As a matter of fact, we have already developed through the Department of Agriculture utilization, research programs, several pretty good industrial uses for farm products.

But there is no bridge between the answer which they find and put in the Department's files someplace and the actual implementation. It sometimes takes a little implementation to get a new concern utilizing a new process. And this Commission should be empowered to encourage, not only the development of the answer, but of developing the actual salesmanship program and construction program.

So we must make our bill, in my opinion fluid enough so we can encourage the development of the economic enterprise that uses the answer which we hope this Commission will help find.

Senator SYMINGTON. Mr. Chairman, I would like to associate myself with the remarks made by the distinguished Senator from Kansas and the distinguished Senator from South Dakota incident to the work that Mr. Welsh has done.

In the letter rejecting the bill introduced by Senator Mundt for himself and Senator Young, the Secretary of Agriculture says:

> From a technical standpoint it would be impracticable to use a 2-percent alcohol blend because of the difficulty of keeping alcohol in solution with gasoline. As for a 5-percent blend of alcohol in gasoline, the alcohol would be retained in the gasoline more easily than in the 2-percent blend, but even so, much of the alcohol would separate out under practical operating conditions.

Do you agree with that statement?

Mr. WELSH. I do very heartily. And 5 percent is the ideal mixture. In 5 percent of alcohol made from grains included in gasoline would consume approximately 700 million bushels of grain a year; 10 percent, 1,400 million. But the reason our Commission did not recommend this is on account of it being such a controversial thing, we thought the development should come through synthetic rubber and plastics that are new fields that are expanding before we get into use of alcohol——

Senator SYMINGTON. You say 5 percent would be ideal, but the letter here says that with 5 percent—

> much of the alcohol would separate out under practical operating conditions

Mr. WELSH. They are not finding that out in Brazil where they make mixtures today out of sugar. And they have from 2 percent and 5 percent and 35 percent alcohol in Brazil today made from sugar in the separate state. And each state has directed the percentage according to the percentage of sugar that they produce within the country.

Senator SYMINGTON. My point is that regardless of price or where you should start first, from your vast technical experience in this field, you do not agree with one of the technical reasons why this program could not be practical?

Mr. WELSH. Why 5 percent——

Senator SYMINGTON. That is right.

Mr. WELSH. I do not agree.

Senator SYMINGTON. You do not agree with that?

Mr. WELSH. No.

Senator SYMINGTON. Is there any force in this country, or any group of people opposing this program that you know of?

Mr. WELSH. If there is, that group is diminishing as they begin to realize that they are a taxpayer and they are having to pay their portion of the bill that is being brought about by trying to solve agriculture problems. And I think that is one of the things that is going to solve our problem, Senator.

I would like to give you just a little——

Senator SYMINGTON. Before you proceed would you say what group it is that you have in mind?

Mr. WELSH. The petroleum interests.

Senator SYMINGTON. Well now, is there any practical evidence that you know of, indicating the petroleum interests have opposed the development of this effort to help the farmer?

Mr. WELSH. Well, I think that we have that demonstration at the time the Senator from South Dakota was talking about, about using

a mixture of alcohol, where station agents were instructed at that time to stop using a mixture or their supply of gasoline would be—that is the reason, public information——

Senator SYMINGTON. That in effect is an effort to enforce a monopoly; isn't it?

Mr. WELSH. Well——

Senator SYMINGTON. You mean that the station agents were told by the companies that furnished the gasoline——

Mr. WELSH. They must not handle Agrol.

Senator SYMINGTON. And if they did, they would lose their franchise?

Mr WELSH. That is the gossip that was out. I do not have that proof.

Senator SYMINGTON. Was there any investigation made of that that you know of?

Mr. WELSH. There was not as far as I know.

Senator SYMINGTON. Thank you.

Mr. WELSH. I would like to give you gentlemen just one very crude example of what we are talking about.

In 106 proposals we have for increased industrial uses of grains, in industry—I am not a scientist, so I am not trying to display my knowledge of science, but I get this from other scientists who are versed in these problems, and all of you remember that just a few years back our writing paper developed big brown spots and became brittle. The reason for that is because the paper industry does use a percentage of starch from grains in making paper, and it would be economical for them to use an additional percentage in making paper. And as they increased this, they found one element—I do not know scientifically what it is, the Department of Agriculture laboratory can tell you all this information—they found this one element in paper that caused this browning and made the paper brittle. So the paper industry, it was not of sufficient interest to them to find out why they could not use it, but they simply cut back on the percentage of starch they used in paper. Now if you find out in one of the laboratories, which I am certain they can do in a matter of a few months or a year's research, how to remove that element, you can add 5 percent more starch to paper in America and then you can consume the starch from 100 million bushels of grain.

Now in a lesser portion we have the same recommendations in these 106 proposals.

Senator JOHNSTON. Any other questions?

Senator MUNDT. I would just like to emphasize there is a great potential, a great consuming power in industry. If our studies were it just as to alcohol, the one thing that is startling is whether or not the farmers of America could raise grain enough to provide the alcohol required for the blend. It is a question of not having enough to utilize, even at a 5-percent blend. And I would like to point out one other thing, that the reason the Indianapolis speedway drivers use this alcohol product in their fuel is not because of economy, but certainly it gives him more propulsion, more speed, and more efficiency.

Senator YOUNG. Mr. Chairman.

Senator JOHNSTON. Yes.

Senator YOUNG. I, too, would like to commend Mr. Welsh and all the Senators here this morning, and all those associated with the Commission, in the excellent job they have done in advancing this program to the point it now is. I think you have done wonderful work. And I understand, too, Mr. Welsh, that many of your people worked without compensaton from the Federal Government?

Mr. WELSH. That is right.

Senator YOUNG. They did not even present a bill?

Mr. WELSH. Fifty percent of the men who served on my committee did not put in an expense account at all.

Mr. Chairman, when it comes to synthetic rubber, to back up to the Jeffers group, and I was in that group, at that time we were consuming 200 million bushels of grain a year to make alcohol out of which synthetic rubber was being made. All of those plants have been cannibalized or destroyed, with the exception of the Louisville plant and one at Pittsburgh, and that is on a standby basis. All of the alcohol plants have been destroyed except the Omaha alcohol plant and the one from Muscatine, Iowa. And we have a representative from that Muscatine plant here today who is operating it as a private institution.

Thank you very much.

Senator JOHNSTON. We certainly thank you for coming.

The next witness, Dr. Charles R. Sayre, cannot be here. So the Delta & Pine Land Co., not having a representative sent this wire which I want to read into the record at this time:

> Regret will not be present for hearing tomorrow. Please express to Senate Agriculture Committee Delta Council's strong endorsement of report and recommendations Commission on Increased Industrial Uses of Agricultural Commodities.

Signed "R. P. Parrish, president, Delta Council."

The Finnish delegation at this time wishes to leave, so I just want to express, for the whole committee, that we appreciate your coming here and listening to our way of procedure in America. We have open house in the committees and people come in and talk to us and tell us what they think is best for our Government in certain activities.

We are certainly glad to have you present with us this morning.

Mr. ENGLUND. Mr. Chairman, Dr. Annila, who is chairman of the Finnish group, has asked me to say on his behalf and on behalf of the Finnish group as a whole, they greatly appreciate the courtesy extended to them by the committee, giving them the opportunity to hear and see the proceedings here.

And I take great pleasure in extending to you, Mr. Chairman, and members of the committee, that word of thanks for them, and also from the secretariat for the excellent material that has been put in their hands, meanwhile, on this important question before your committee.

Senator JOHNSTON. We are certainly glad to have had you.

Senator YOUNG. Mr. Chairman, could I say this before they go?

I think everyone in America remembers that the Finnish people insisted on paying back every cent we once loaned them.

Senator JOHNSTON. This is Senator Young from North Dakota. We recognize that, and we appreciate that. I understand Senator Mundt desires us to go down the witness list to Charles Bruett, our secretary, South Dakota's department of agriculture.

Senator MUNDT. I would appreicate that, because I have a committee meeting this afternoon, and our secretary of agriculture is here.

Senator JOHNSTON. I am going to ask Senator Young to preside, as I have another matter that I must look into concerning the pay bill that is back on the floor.

Senator YOUNG (presiding). Off the record.

(Discussion off the record.)

Senator YOUNG. You may proceed.

STATEMENT OF CHARLES BRUETT, SECRETARY OF AGRICULTURE OF THE STATE OF SOUTH DAKOTA, PIERRE, S. DAK.

Mr. BRUETT. Mr. Chairman, and distinguished gentlemen, my name is Charles Bruett, secretary of agriculture of the State of South Dakota.

First of all, I am a farmer, and a farm owner, and have been for 40 years, engaged in grain and livestock farming. I have had 16 years of service in the State legislature and am the present secretary of agriculture in South Dakota. I suppose you want me to be as brief as possible in my testimony?

Senator YOUNG. You may proceed in the way you want.

Mr. BRUETT. I will file some briefs with you.

Senator YOUNG. If you will highlight it, it will help.

Mr. BRUETT. The reason we are alarmed in South Dakota is because of the large stocks of Federal grains, the large stocks of grains that are in Federal bins, either owned or controlled by the Federal Government. We have 262 million bushels alone. And this is increasing every year. So it is almost impossible for the free market to function at all. The threat of dumping is always there, and the result has been that supports are not only supports, but they have become a ceiling as well. The history of support prices is that the open market hovers just a little bit below the support prices at all times, except in extreme emergencies. And that being the case, we feel that that places too much power into the hands of one man, when he can set the ceiling price and call it a support price.

We feel that the surplus is the result of wartime stimulations in our State by the Federal Government. We feel that when industry was so stimulated adjustments were made under war contracts, and we would like to have the same consideration through chemurgy.

Our cattle industry in South Dakota has been taken care of by buying up breeding stocks, a few years ago, processing them, distributing the meat through various programs, and removing that surplus. Now we have a flourishing cattle market without any Federal aid or Federal supports, and it is in a very healthy condition today, and it is because the surplus is not there.

And we believe that the same procedure of removing this war-stimulated surplus should go far to supplement the present, almost complete dependability on Federal supports and give the open market a chance to function as it is doing in the meat industry. And we believe that if we could do that, we could have full production on our farms instead of part production. We are concerned about the acreage reductions in our State. It is pretty rough on some of the farmers. It seems that there is something very much missing, when in spite of all these unusual restrictions in acreage, the surplus keeps

building and building to a point where, if we do not correct it, the entire program is in danger.

Another thing that we find seriously wrong with the present program is its uncertainties. We do not know from year to year what Congress will do with regard to appropriations to finance this structure. We do not know from year to year what directives will come from Washington relating to the restrictions on acreage. We do not know when this vast accumulation hanging over our heads will be dumped on the market and destroy it.

But we do know that no sound program, farm program, can stand on that shaky a foundation.

We feel that the soil bank has certain virtues, but it is unreasonable to expect that Congress can indefinitely keep making these unusual appropriations for its activation. But, on the other hand, it is also unreasonable for the Government to expect that the man on the farm can keep shrinking his output to the point where he cannot profitably operate. When you are asked to take about a third of your land out of production, you idle much of your farm machinery, you decrease your fuel consumption, you idle many men on the farm that are working in agricultural pursuits off and on the farm. You hurt the manufacturer of tractors and the people employed in those places, as well as those who are engaged in transporting grains, elevator services, motor-fuel dealers, and everyone on Main Street. All of these people are just as much dependent on agriculture and a full production as the man who rides the tractor.

And this we know: No one can long stay in business if he is limited in his production. There is only one way to succeed, and that is by increasing your business, and not by shrinking it.

Many of us in South Dakota believe that we can have a sufficient market with full production on our farms. We believe that the only expanding market we have, a great expanding market, is our own country, creating our own markets and diverting these unusual surpluses to good use in an ever-expanding industry.

The high cost of operating our farms is such that we can hardly afford to make further and further reductions in acreage, or bushels, and the logical place to find a worthwhile use for the crops that are produced in surplus and not needed for human or animal consumption is for industrial uses. We feel that they can be used in the manufacture of synthetic rubber, for industrial alcohol, as a blend with motor fuels and the like, and starch in corn—400 million bushels can be used for insecticides, paper, clothing, and the like.

Automobiles in our country consumed some 36 billion gallons a year. A 5-percent mixture would consume 700 million bushels of grain. Synthetic rubber would consume, if all the synthetic rubber were made from grain alcohol, another 200 million bushels of grain.

Out Government buys large quantities of alcohol for jetplanes, rockets, guided missiles, turbojets, and such. That is another source.

Talking about synthetic rubber, I sat in here listening in this morning, and I heard about the Omaha plants. I was farming when that plant was in operation during World War II, and it seemed to me it consumed about 3 million bushels of corn and wheat every month.

We had another one in Yankton, S. Dak., and a third one starting in Huron, S. Dak., and I can assure you they were a godsend to that country at that time.

One year we had corn; we call it soft corn, and you may call it immature corn here—I had a lot of it. I saved what I could, and I sold the rest to this plant in Yankton, S. Dak. It was partly spoiled grain, but I got a full price for it because the alcoholic contents had not been impaired. And ever since that time I have been quite an enthusiast about alcohol plants, industrial-alcohol plants, in a farming area such as I represent today.

Today we hear so much about the cost factor, that grains are too high for that purpose, that it cannot be used, that I sometimes question whether a full attempt is made to find the answer.

But to do away with surplus that we are talking about, it seems to us in South Dakota that the best incentive to activate this program, to get rid of this surplus, would appear to be a program whereby industry can buy grains now held in inventory by the Government at a price which will permit their economic use. They are losing a lot now. They would not lose that much on a program of this kind. And, as a matter of fact, they have been doing that with potatoes, and I quote from a news release from Washington, D. C., last fall:

> Under the program started last fall, the Department pays growers 40 cents a hundredweight for potatoes diverted to starch, flour, and livestock feed. It has been operated in such major producing States as North Dakota, Minnesota, Montana, Maine, Washington, Oregon, California, Idaho, and Colorado.
>
> The Department said the supply situation has improved to such an extent that the diversion program is no longer needed to stabilize markets.

It does work when they use it in that way.

I am going to skip quite a bit of this, because you have the brief filed with you.

But we feel that all this study and all this research and the money that is being spent for that purpose have little or no value if the results are not converted to a practical use. And they can be converted to a practical use. Creating new markets for farm production, whatever they may be, would be a tremendous step forward in the economy of agriculture and of the entire Nation.

It would do away with acreage cutting to the point where you cannot operate, and it would save the average-size farmer from annihilation because, when they have to take too much of the land out—they cannot operate on a half section of land. They either have to go buy more land or go out of business. And there is nothing gained, because the net result is the surplus piles up anyway.

We have had many meetings in South Dakota concerning this very problem, and here is one instance where the State farmer's union of the State of South Dakota, the State farm bureau federation, and the State grange are in complete accord.

Senator YOUNG. That does not very often happen, does it? [Laughter.]

Mr. BRUETT. We had a joint meeting of these 3 organizations at Huron, S. Dak., and the 3 State presidents and the administrative officers signed a resolution directed to Congress to activate such a program.

Then we have a South Dakota Farm Council. They, likewise, have placed their complete approval on this project. And our Governor Foss, of South Dakota, is an enthusiast of this particular project.

There is much in here that I have not presented. I think you are talking here today about commercial uses, and part of this brief is devoted to a bushel program instead of acreage reduction.

Senator YOUNG. All of your statement, Mr. Bruett, will be made a part of the record.

Mr. BRUETT. In the record; yes. So I think that, because of the late hour, I will close with that.

Senator MUNDT. Mr. Chairman, I would like to congratulate Charlie Bruett on a very informative and instructive statement. I know, of my own personal knowledge, well, over 20 years, way back in the days when he was farming and a member of the legislature, he used to go around the State advocating these programs. He is one of the early pioneers, and I can reinforce what he says; that, during the days when they were having these alcohol plants, wartime plants, in Yankton and Huron, in our area, we were also raising a lot of soft corn, unhappily, on my own farm, and it was a godsend to be able to sell that soft corn, frequently corn which was unfit for even animal consumption, at standard prices because the alcohol market, the commercial-alcohol market, is a market which is unaffected by the condition of the corn, and it was suitable for fermentation, even though it suffered from an early frost or a wet maturing season, and would be sold at a great discount, if it could be sold at all, in normal commercial markets.

Mr. BRUETT. Mr. Chairman, may I go just a little bit further—not very much, but just as an illustration—I had a farm in the northern part of Hanson County, 160 acres in that particular farm. I had a 45-acre wheat base, and I was a wheat farmer, I had several farms, but that was my wheat base on that particular farm. I sold that farm and bought another one, 8 or 10 miles south. I was a wheat farmer. Here is my wheat quota for next year, eight tenths of 1 acre. We cannot go on with that kind of stuff because I am renting the farm for a third of the crop, so I get about a half a bushel for my share of that farm.

I used to raise it by the thousands of bushels.

Senator YOUNG. I think you have gotten at the crux of our farm problem today, and that is excessive surpluses. A Government price-support program operates fair when you do not have the surpluses, but when you pile up excessive surpluses——

Mr. BRUETT. Nothing works after that. And if we could get rid of that surplus, I believe the market would take care of itself to quite an extent. And we are very enthused in South Dakota relative to this reducing the surplus, reducing it to alcohol, and I hope, and we all hope, that you gentlemen will see fit to keep pecking away at it because we also know it is a big job.

Senator YOUNG. Thank you.

(Mr. Bruett's prepared statement is as follows:)

My name is Charles Bruett, State secretary of agriculture of the State of South Dakota. A farmer and farm owner for many years engaged in grain and livestock farming and also have had 16 years of service in the State legislature in both the house of representatives and senate; as well as a wide experience in the field of agricultural farm programs, having served on all the local committees including service as the county chairman of the AAA for 5 years.

Agriculture in South Dakota is basic and the State's entire economy and well-being rises and falls with the condition of agriculture. That is why we in South Dakota and in State government are so deeply concerned with its welfare.

We become somewhat alarmed when grains in Federal bins, commercial bins, and on the farms, either owned or controlled by the Federal Government, stand out as a constant threat to a free market. With 262,438,000 bushels under Federal control in South Dakota alone, as of April 1, 1958, and increasing year by year, it is next to impossible for the free market to function. The threat of dump-

ing is always there and the result has been that the Government supports are not only supports but become a ceiling as well. The history of support prices has been that the open market hovers just a bit below support prices except in extreme emergencies and it imposes a ceiling in those cases.

The present farm surplus is the direct result of a wartime stimulation of production as requested and urged by the Federal Government, and improved farming methods. Industry was similarly stimulated but the Federal Government made adjustments when these wartime contracts expired. All we in agriculture ask is that the same consideration be extended to us so that we too can operate without a wartime stimulated surplus hanging over our heads.

Several years ago when cattlemen were in trouble because of declining prices, the Government inaugurated a cattle buying program of breeding stock, processed the meat and distributed it through their various programs, thereby removing their wartime stimulated surplus. With the result that the cattle market has flourished without any Federal supports or Federal aid whatsoever ever since and is in a very healthy condition today.

It is our belief that the same procedure of removing this war stimulated surplus would go far to supplement the present, almost complete, dependence on Federal supports and give the open market a chance to function as in the meat industry. This can never be attained unless we first of all dispose of this enormous surplus, and secondly, reexamine the possibilities of finding new markets at home and abroad for that portion of a full production not needed for human and animal consumption.

There has always been something missing and there is something seriously missing today, when, in spite of unusual restrictions in acreage, such a tremendous surplus keeps building and building and building, to a point, where if not corrected, the entire program will become so topheavy it will fall from its own weight.

There is another thing seriously wrong with the present program and that is its uncertainties. We do not know from year to year what Congress will do in regard to the appropriations to finance this tremendous structure. We do not know from year to year what directives will come from those in charge, relating to restrictions in acreage. We do not know when this vast accumulation of surpluses will be dumped on the market and destroy it, and no sound and permanent farm program can be based on that kind of a foundation.

The soil bank, as such, has certain virtues but it is unreasonable to expect that Congress can indefinitely keep making these unusual appropriations for its activation.

It is also unreasonable to expect that Congress will indefinitely support markets at certain levels in the face of an ever-mounting surplus. But, I do contend that supports are necessary to tide us over that period until a more stable farm program is established.

It is also unreasonable for Government to expect that the man on the farm can shrink his output to the point where he cannot profitably operate. When you are asked to take one-third of your land out of production, you not only decrease the Nation's new wealth, but you idle much of your farm machinery thus decreasing your fuel consumption. You idle many of the men who are working in agricultural pursuits on and off the farms. You seriously hurt the manufacturers of tractors and people employed in those places as well as those who are engaged in the transporting of grains, elevator services, motor fuel dealers and the business places on main street. All of these above mentioned are just as much dependent on agriculture and a full production as the farmer who rides the tractor.

No one can long stay in business if he is limited in his production. We all know that you can only succeed by increasing and not by shrinking your business.

Many of us in South Dakota believe that we can have a sufficient market with full production on our farms. We do not believe in shrinking our output, neither do we believe tht we can long continue subsidizing foreign markets and build a sound farm economy on anything as uncertain as that. We fully believe that the only expanding market we have—a greatly expanding market—is in our own country; creating our own markets and diverting these unusual surpluses to good uses in an ever-expanding industry.

As years go on, these foreign markets we hear so much about, are producing more and more of their own food. We teach them how. We sell them our machinery, our fertilizers and teach them our better methods of farming. Today some of these small nations are plagued with a surplus of their own and there are definite limits to the amount we can dispose of in foreign countries.

The high costs of operating our farms are such that we can hardly afford to make further and further reductions in acreage or bushels, and the logical place

to find a worthwhile use for the crops that are produced in surplus and not needed for human and animal consumption is for industrial uses.

1. For the manufacture of synthetic rubber.
2. For industrial alcohol.
3. As a blend with motor fuels and the like.
4. Additional uses for corn—starch, insecticides, paper, clothing—400 million bushel possibility.

Automobiles in the United States alone consume some 36 billion gallons of gasoline in a year—not millions but billions—and if they were required to use a 5 percent blend of grain alcohol in every gallon they would consume 700 million bushels of our surplus grain in 1 year. A 10 percent mix would consume 1,400 million bushels.

The alcohol from 1 bushel of grain will produce from 6 to 7 pounds of synthetic rubber. If all the synthetic rubber used in our country were made from grain alcohol, it would consume another 200 million bushels of grain every year.

Our own Government is obliged to buy large quantities of alcohol as fuel for jet planes, rockets, guided missiles, turbojets, and reciprocating engines. Most of this alcohol is made from blackstrap molasses and from petroleum fractions. The blackstrap molasses is imported.

These uses are not new as they have been and are effectively used in several countries where gasoline is scarce and exceedingly high priced.

Going a little further on the manufacture of synthetic rubber from grain alcohol. During World War II, when we were cut off from our natural rubber supply, all our tires for the Armed Forces as well as for civilian use, were made from grain alcohol. The Government built a plant at Omaha, Nebr., large enough to consume 3 million bushels of grain every month. Another plant was built at Yankton, S. Dak., and a third was in the process of building at Huron, S. Dak., when the war ended. Other plants throughout the United States—8 of which are still owned by the Government, including the one in Omaha, but have been inactive for a good many years.

I personally sold corn to the plant at Yankton. The corn had a green mold all through it and was not fit for animal consumption, but I got full market price for that corn because the alcoholic content had not been impaired. Also the residue or mash is high in protein and such, and can be used for feeding purposes and manufacture of commercial feeds. It is estimated that the sale of these byproducts would well pay for the operation of extracting the alcohol.

There is serious oppostion to a move of this kind—there always is. They bring the price factor of grains and that is a consideration. Let us examine that briefly. It isn't hard to figure. It takes approximately 20 pounds of grain to make a gallon of alcohol. This may vary because all grains, as well as potatoes lend themselves to this purpose. However, corn is perhaps the leader and it takes 20 pounds of corn. If the market value of grain is at the rate of 1 cent a pound, the cost would be 20 cents a gallon, or at 2 cents a pound, it would be dou le that amount. You, of course, understand that we are talking about that portion of our farm commodities that is not needed for human or animal consumption, but that which is in surplus and a drag on the market and a source of tremendous Government expenditure.

To arrive at a fair estimate of the cost factor, we must take into consideration the enormous amount paid out by the Government for storage, handling, and resealing the grain now in storage in Federal bins, which now approximates $1 million every day, just for storage. The best incentive to activate this program would appear to be a program whereby industry can buy grains now held in inventory by the Government, at prices which will permit their economic use.

As a matter of fact they are doing just that with potatoes and I quote from a news release from Washington, D. C.:

"Under the program started last fall, the Department pays growers 40 cents a hundredweight for potatoes diverted to starch, flour, and livestock feed. It has been operated in such major producing States as North Dakota, Minnesota, Montana, Maine, Washington, Oregon, California, Idaho, and Colorado.

"The Department said the supply situation has improved to such an extent that the diversion program is no longer needed to stabilize markets."

A third consideration on price per gallon is the deduction of 5 or 10 percent from each gallon of gasoline for the substitution. These are some of the possibilities.

It is definitely possible to set into operation such a program within the framework of our private enterprise system. Some Federal legislation and assistance would be needed to set up such a program and get it into operation and give it the

stability that it must have to survive. A lack of that protection would make it impractical and difficult for private enterprise to survive in this project.

Much is being done in study and research and much money is being appropriated and spent for that purpose, but all this has little or no value if the results are not converted to practical uses. Creating new markets for farm production, whatever they may be, would be a tremendous step forward in the economy of agriculture and of the entire Nation.

The present program of acreage control has been tried since the very inception of this act, and has failed to provide the results for which it was intended. It whittles down the size of our operations to be sure, but it has done little if anything to control the final national production. Take corn for instance. It has tended to make a corn country out of what formerly was a cotton country, inasmuch as the cotton producers, faced with this acreage control used their diverted acres for the production of corn. The same is true all down the line. This acreage control has been the means of working a hardship, and in many instances eliminating the average-size farmers who are so vital in our economy.

As a substitute for acreage control, I would recommend that marketing quotas, and marketing quotas only, based on full production on a farm with a guaranty of high parity for that portion necessary for domestic needs and the visible export demands and making a complete exemption of the farm that produces 500 bushels or less. Where marketing quotas are invoked, a certain percentage of the commodity, based on domestic needs and visible exports, will be permitted for sale, which may be 75, 85, or 90 percent of the total production. The remaining, or so-called surplus production, will remain on the farm where produced, in the possession of and the property of the farmer to do with as he sees fit, except sell it on the open market. Use it for feed if he so desires, or keep it in his own bin as an insurance against a smaller crop or crop failure the next year. He might use it to add to his next year quota if he fails to produce his quota for that year.

Marketing quotas invoked in this manner would have a tendency to regulate production in line with demands on every farm, inasmuch as when a farmer would accumulate an excessive amount of one kind, he would naturally and of necessity convert to another. Marketing quotas, if properly handled become a stimulus to the free and open market as it would be an assurance that the market would never face a supply greater than the demand. However, marketing quotas and import restrictions must go hand in hand as it would be futile to restrict our own and open the door to foreign countries. Marketing quotas will do away with unnecessary, punitive, and unwelcome administration of which so many farmers are resentful. They would remain the masters of their own farms. It would reduce the cost of administration tremendously and it would insure complete freedom. It is sound because the open market responds to a commodity that is in demand and not in surplus.

A program based on a full production offers full employment and a future for all people directly concerned with production and all people in related industries.

Using surplus grains for industrial purposes opens the door for the employment of thousands of workers and marketing quotas, when found necessary, will definitely prevent a glutted market as the salable grains will equal the amount permitted to be marketed.

With a program of scarcity we go backward. With full production we progress. Agriculture should be permitted to progress along with all other industries in the Nation.

The three major farm organizations in South Dakota, the State Farmers Union, State Farm Bureau Federation, and the State grange are in accord on the promotion of industrial uses of surplus grains. At a joint meeting the State presidents of these organizations signed a resolution directed to Congress to activate such a program. The South Dakota Farm Council likewise placed its approval on this project and request that it be activated with dispatch.

Senator YOUNG. Mr. Blake.

Senator MUNDT. Mr. Chairman, I hate to leave before Rhea Blake makes his presentation as to cotton—in my opinion, he knows all the answers there are to know in the cotton industry—as I have heard him talk long and frequently, and I am always tremendously impressed and greatly convinced with what he has to say, but I have a luncheon appointment and must leave; so, I give my tacit approval

in advance to anything that Rhea Blake may say before this committee.

Mr. BLAKE. Thank you so much, Senator Mundt.

STATEMENT OF WILLIAM RHEA BLAKE, EXECUTIVE VICE PRESIDENT, NATIONAL COTTON COUNCIL OF AMERICA

Mr. BLAKE. Mr. Chairman, I am very much aware of the lateness of the hour, and I am going to cut this testimony very sharply from the prepared manuscript that we have here.

I would like with your permission, to file the whole statement for the record.

Senator YOUNG. It will all be made a part of the record.

Mr. BLAKE. Then I will just pick a few highlights that I feel need special emphasis.

Senator YOUNG. Fine.

(The statement referred to is as follows:)

Mr. Chairman and members of the committee, my name is Wm. Rhea Blake. I am executive vice president of the National Cotton Council, which is the overall organization of the raw cotton industry. The council's membership is made up of cotton farmers, ginners, warehousemen, merchants, spinners, and cottonseed crushers in all 19 cotton-producing States.

Since its organization in 1938, the council has based its efforts to increase the use of cotton, cottonseed, and their products, on two programs—research and promotion. The cotton industry recognizes clearly that nothing is more important than research in making cotton competitive in quality and in price. Research has therefore been one of our major activities for the past 20 years. During this period we have developed a staff that not only knows intimately cotton's current position in research but also has carefully mapped cotton's research needs and opportunities for the years ahead.

I am appearing here on behalf of the council to urge support of the principles embodied in both S. 724 and S. 2306. The passage of legislation of this type—greatly expanding agricultural research—would get at some of the basic problems of American agriculture, and could begin to lay a real foundation to overcoming what has been so frequently termed the "farm problem."

It is gratifying that the Senate has moved so positively following the recommendations of the President's Commission on Increased Industrial Use of Agricultural Products. The raw cotton industry has shown intense interest in the Commission's work and its report. In response to this interest and in recognition of the pressing need to implement the recommendations of the Commission, the delegate body of the National Cotton Council, at its annual meeting in Phoenix, Ariz., in January, 1958, adopted the following resolution:

"That the council support legislation consistent with findings and recommendations of the President's Commission on Increased Industrial Use of Agricultural Products and which would provide for the initiation of a vigorous program of research and development on problems important to expanding cotton's markets, including a suitable recognition of opportunities for improving raw cotton quality and lowering of production and handling costs."

Now, Mr. Chairman, may we take just a minute of the committee's time to cite once more the four main needs stated in the Commission's report. These are: (1) the need for a sharper sense of the importance, the possibilities, and the urgency of the industrial utilization approach to farm surplus problems; (2) the need for a greatly expanded program of fundamental and applied research and education; (3) the need for more trained scientists whose talents can be applied to farm problems; (4) and the need, in certain cases, for financial incentives to carry research from the experimental stages into actual commercial exploitation. If these four needs apply to all of agriculture as pointedly as they do to cotton, the Commission has indeed mapped out a constructive course for determined, positive action which can have beneficial effects on agriculture for many years to come.

We wholeheartedly endorse the basic findings of the President's Commission. We support legislation which would implement the recommendations of the Commission, and we welcome the opportunity to comment specifically on the bills before your committee. May we give a brief description for your committee

of just how vitally such a program as that envisioned in these bills could affect the cotton farmer and the industry dependent on his product. We will refer generally to certain provisions which, in our opinion, would strengthen and make more effective the legislation you are considering. With your permission then, here are some pertinent, key facts on cotton, and on what a greater research effort could mean to the cotton farmer and to the cotton industry.

Cotton is a crop of major importance in our farm economy. It is grown on 840,000 farms in 19 States from the Atlantic to the Pacific. The farm value of cotton in 1956 was about $2.5 billion. More than 1.2 million workers are engaged in the spinning, weaving, and apparel manufacturing of cotton. The value added to cotton, by processing beyond the farm, is greater proportionately than the value added to any other major farm crop. It averages 7½ times the farm price of the product. Thus a far greater share of our national economy than agriculture alone depends on this vital fiber crop.

Cotton, aside from the seed and its products, is already utilized 100 percent in industrial (nonfood) uses. The Commission's report points out that the opportunities for finding new uses for cotton are limited. It should be made abundantly clear, however, that the opportunities for increasing the use of cotton, in its present markets, are tremendous. Research holds the key to these opportunities, by (1) improving the quality of cotton and its products, and by (2) reducing the cost of its production to make it more competitive relative to other fibers, and, at the same time, to improve farm income.

Mr. Chairman, and members of the committee, may we direct your attention particularly to this latter point. The Commission's report, in discussing cotton, recognizes the importance of reducing production costs through a greatly expanded research and development program. In considering the industrial utilization of agricultural products in general, the Commission pointed out the importance of such factors as the cost of the products and its constant supply. The report said "A very few cents per pound difference in cost may cause a raw material to be attractive or unattractive to industry. Lowered production costs are always important to the net income of farmers whatever the outlets for which they produce. In every effort to establish new and less competitive crops, as will be emphasized elsewhere in this report, production research will be vital."

May we point out that this is not a matter which applies just to new crops. Cotton is at this time suffering from just such a squeeze, based on a difference in cost—6 to 10 cents a pound at the mill door—which at present favors the competitive fiber rayon. Research to reduce the cost of growing cotton—to make it more competitive in price—would be ranked high in priority by the cotton industry.

This matter was 1 of the 13 basic views enumerated by the Commission in its report. These are the exact words: "Production and economics research designed to reduce costs of production and upgrade quality are recognized as essential parts in an integrated industrial-uses program."

The Commission mentioned as a particularly appropriate type of production research that which is aimed at reducing certain costs in producing cotton. There is ample opportunity to do this. Consider the fact that problems associated with insects, diseases, and weeds now add an estimated 12 cents to the cost of producing the average pound of cotton.

Production research aimed at cost-cutting possibilities obviously can lead to greater industrial use of cotton, while at the same time increasing the return to the farmer. The Commission definitely recognized this, and it was clearly the intent of the Commission to recommend such cost-cutting production research. We therefore strongly urge the committee to clarify the appropriate sections of the bills which are under study so that, as one important and direct means of increasing income to farmers, research will be directed toward reducing farm costs and thus toward increased utilization of farm products.

One of the big questions the Congress must face in considering legislation of this type—a question which may very well be a concern of your committee, Mr. Chairman—is: Can a great increase in the funds for support of agricultural research really do any good? This is certainly a question which ought to be considered very carefully. We think the evidence of what research has done for industry is pertinent, as is the great importance and significance of research to the military. We think that both research authorities and agricultural authorities would agree that such an investment will pay off many times over. It is obvious that the President's Commission reached just such a conclusion. However, perhaps the most helpful thing we could do for your committee, Mr. Chairman, would be to describe some examples of cotton problems which research can overcome, and some opportunities to increase cotton's markets through re-

search. We think that these will leave no doubt in your minds on how greatly this type of research support could benefit the cotton farmer and the industry which uses his product.

As I have already suggested, many of the possibilities for increased utilization of cotton seem to rest rather heavily on solving problems relating to cost and quality back in the production side of our industry. The first three examples, which I will mention, illustrate these possibilities in production.

1. The boll weevil and other cotton insects, on an average, add about 4 cents per pound to the costs of producing cotton for the belt as a whole. In many years, and in many parts of the belt, costs directly associated with these pests, amount to 2 or 3 times this average. We can finally see some really exciting possibilities for controlling—perhaps eliminating—the boll weevil, if the research effort is adequate. Few developments could do more to improve farm income in certain parts of the Cotton Belt. Just as research is the key to dealing with roughly parallel problems of the Mediterranean fruitfly, the Japanese beetle, cattle grubs, screwworms, and other pests, it offers the same or greater promise for lessening the costly problem of cotton insects.

2. Farmers spend an estimated $340 million, or about $20 an acre, during an average year in efforts to control weeds in cotton. In addition to these direct expenses, weeds also reduce the income from cotton by lowering the quality of lint, and by interfering with the fuller application of other cost-reducing practices such as mechanization. Here again, research holds the key to a truly important possibility for both increasing incomes and getting cotton's costs more nearly in line with its industrial competitors.

3. We invite your attention to the important role that research in genetics and plant breeding can play in improving cotton for its many different industrial uses. Over the years, much of the emphasis in this work has been on increasing yields, and on improving the length and strength of the fiber. Accomplishments along these lines have been outstanding. However, as we look at the rapidly developing picture of textile technology, it seems clear that many opportunities for increasing the use of cotton will turn on how well cotton can meet new and rigid performance specifications—on the shape of the fiber, its elastic properties, its receptivity to dyes and finishes, and the like. The manmade fiber producers look to the chemistry laboratory for their opportunities in meeting these requirements, and as I shall point out later, cotton has many similar opportunities. But these properties, many of which are essential to developing larger markets, can also be improved by manipulating the germ plasm of the cotton plant itself. This promising, and relatively undeveloped, area of production research certainly is important to the increased utilization of cotton.

Another key opportunity in expanding the use of cotton can be found in the way this $2 billion commodity goes to market. The basis for marketing cotton, once relatively advanced for an agricultural product, has remained almost unchanged in spite of tremendous technological advances in production-harvesting-ginning practices on the one hand and equal radical modernization of mill-manufacturing processes on the other. The result is that farmers and ginners work to develop and preserve one level of quality while mills seek substantially different qualities in cotton.

The confusing situation which results from the use of outmoded marketing criteria seriously hampers mills in selecting the cotton best suited for their processing conditions and their products. New methods for measuring the true quality of cotton—which can only come about through research—can greatly contribute to the more efficient and more widespread use of cotton.

We think these problems—and opportunities—in producing and marketing cotton efficiently for industrial use very likely are typical of those which face any agricultural product, new or old. But in every case two more basic questions must be answered. First, is the farm product actually suitable for industrial use, and second, can it compete on a quality basis with other industrial raw materials?

In the case of cotton, the answer to the first question is self-evident. This agricultural product (except for seed) goes 100 percent into industrial or nonfood uses. It is the principal fiber of the United States and world textile industries. It fills more different uses, by far, than any other fiber. As a product already established in industrial or nonfood markets, it offers great opportunities for increased use and in turn for increased acres of useful farm production. No new crop—as important as the study of such potentials may be—can hope to match the direct, almost immediate potential for industrial markets which adequate research could develop for cotton.

Can cotton continue to compete with other industrial raw materials? Can its use qualities be improved? These are questions which the Cotton Task Group of the President's Commission examined with particular care. The report of that task group clearly shows that: (*a*) the greatest opportunity for increasing the use of cotton is by an expansion of its present uses; (*b*) new modified cottons, resulting from research, have already demonstrated their ability to compete with the best of the synthetics; (*c*) the opportunity to make further improvements is as great as the need. Cotton can continue to be a major industrial raw material and a major farm crop if it receives sufficient effort in research and development.

We hope that these examples have made it abundantly clear that the legislation which your committee is considering could make a tremendous contribution to relieving the "cotton problem." The United States Department of Agriculture and the land-grant colleges are presently making vital contributions in many of the areas we have cited. However, the effort is all too small. In some cases it falls short because of the lack of the broader authorities which the legislation before you would provide. There is a real need to maintain and to strengthen the present research-educational setup, and to make full use of the many sincere and devoted scientists who comprise its program. It seems to us that your committee has before it now what are, in effect, recommendations for not only expanding, but for strengthening and making more effective the entire agricultural research effort.

The administrative organizations suggested by bills before this committee deserve the most careful study. We strongly urge that your committee consider carefully an administrative mechanism that takes full advantage of the facilities, personnel, and experience of the Department of Agriculture, yet which works to strengthen the United States Department of Agriculture research programs and expand their effectiveness. Your decision on this point may very well hold the key to success or failure in the entire effort.

In summary, these seem to us to be facts of major importance in the matter before your committee:

(1) The soundest way to increase the industrial utilization of farm products is through research which will (*a*) lower cost, (*b*) upgrade quality, and (*c*) improve processes and products. All three types are vitally needed.

(2) The biggest, most direct, and most promising opportunities to improve farm income are through increasing the industrial use of farm products which have already demonstrated their ability to compete in these markets.

(3) Both a substantial expansion and a strengthening of agriculture's research programs are necessary if the opportunities we can now see in research are to be seized. There is nothing small or insignificant about the problems agriculture faces. Many of those problems can be overcome through research, but the effort must be on a real, all-out scale commensurate with the task.

(4) Building a sound administration for agricultural research takes time and demands sincere support both from within and outside of Government. Great progress has been made in making the programs of the United States Department of Agriculture more effective. Any administrative changes that might weaken these vital programs of the United States Department of Agriculture should be avoided.

Mr. Chairman, we commend you and the members of your committee, and also the authors of the bills before you, for your foresight in recognizing the importance of research as a basic solution to agriculture's problem. We think that the magnitude of the task before us fully justifies the size of funds which would be authorized or appropriated in the bills before you. The problem agriculture has faced in the past, however, was in obtaining appropriations already authorized by Congress. We hope that your efforts will go far to create a more favorable attitude toward actually making available the funds so badly needed.

Mr. BLAKE. Mr. Chairman, and members of the committee, my name is William Rhea Blake. I am executive vice president of the National Cotton Council with headquarters at Memphis, Tenn.

The council is the overall organization of the raw cotton industry, and its membership is made up of cotton farmers, ginners, warehousemen, merchants, spinners, and cottonseed crushers in all 19 cotton-producing States.

Since its organization in 1938, the council has based its efforts to increase the use of cotton, cottonseed and their products on two programs: Research and promotion.

The cotton industry recognizes clearly that nothing is more important than research in making cotton competitive both in quality and in price.

Senator YOUNG. How many years, Mr. Blake, have you been testifying before the Appropriations Committee?

Mr. BLAKE. I think about 20, sir. That is how long the Cotton Council has been operating.

Actually, research has been one of our major objectives, one of our major activities, for the past 20 years; and during this period we have developed a staff that not only knows intimately cotton's current position in research, but also has carefully mapped cotton's research needs and opportunities for the years ahead.

I am appearing here on behalf of the council to urge support of the principles embodies in the several bills before you.

My statement refers to two of them by number. We understood they were the only two under consideration, but we understand now there are several more: Senator Mundt's bill, Senator Johnston's bill, in addition to the one by Senator Capehart and Senator Curtis.

The passage of legislation of this type, which means greatly expanded agricultural research, would get at some of the basic problems of American agriculture, and could begin to lay a real foundation for overcoming what has so frequently been termed "the farm problem."

Therefore, Mr. Chairman, we wholeheartedly endorse the basic findings of the President's Commission.

We support legislation which would implement the recommendations of the Commission, and we welcome the opportunity to comment specifically on the bill before your committee.

Now, may we give a brief description of just how vitally a program such as that envisioned in these several bills could affect the cotton farmer and the industry dependent on his product?

Cotton, aside from the seed and its products, is already utilized 100 percent in industrial—that is, nonfood—uses. When we talk about our market for cotton, we are talking about industrial uses.

The Commission's report points out that the opportunities for finding new uses for cotton are limited. It should be made abundantly clear, however, that the opportunities for increasing the use of cotton in its present markets are tremendous. Research holds the key to these opportunities:

By (1) improving the quality of cotton and its products, and by (2) reducing the cost of its production to make it more competitive relative to other fibers and, at the same time, to improve farm income.

Mr. Chairman, may we direct your attention particularly to this latter point?

The Commission's report, in discussing cotton, recognizes the importance of reducing production costs through a greatly expanded research and development program.

In considering the industrial utilization of agricultural products in general, the Commission pointed out the importance of such factors as the cost of the products and its constant supply. The report said, and I am quoting:

> A very few cents per pound difference in cost may cause a raw material to be attractive or unattrative to industry. Lowered production costs are always important to the net income of farmers whatever the outlets for which they produce. In every effort to establish new and less competitive crops, as will be emphasized elsewhere in this report, production research will be vital.

Now, may we point out that this is not a matter which applies just to new crops.

Cotton is at this time suffering from just such a squeeze, as has been described here in the Commission's report, based on the fact that rayon holds a 6- to 10-cent price advantage over cotton at the mill.

Research to reduce the cost of growing cotton, to make it more competitive in price, would be ranked high in priority by the cotton industry.

This matter was 1 of the 13 basic views enumerated by the Commission in its report. These are the exact words:

> Production and economics research designed to reduce costs of production and upgrade quality are recognized as essential parts in an integrated industrial-uses program.

The Commission mentioned as a particularly appropriate type of production research that which is aimed at reducing certain costs in producing cotton.

There is ample opportunity to do this. Consider the fact, Mr. Chairman, that problems associated with insects, diseases, and weeds, now add an estimated 12 cents to the cost of producing the average pound of cotton.

Think of this! Twelve cents a pound is involved in these three things: Insects, diseases, and weeds.

And, mind you, we would only need to realize half of that as savings to make us competitive with not only rayon in this country, but with foreign cotton as well in the world market.

Our problem could be whipped if the cost of these three items could be cut in half.

Now, production research aimed at cost-cutting possibilities obviously can lead to greater industrial uses of cotton, while, at the same time, increasing the return to the farmer.

The Commission definitely recognized this, and it was clearly the intent of the Commission to recommend such cost-cutting production research.

We therefore strongly urge the committee to clarify the appropriate sections of the bills which are under study that this one important and direct means of increasing income to farmers, namely, research directed toward reducing farm costs, will be properly emphasized.

One of the things that bothers us about these bills is that they leave the implication that there is nothing more needed in the area of production research, that we need to concentrate solely on a utilization research. But the biggest hurdle we have in increasing utilization of cotton is being out of line in price, which means out of line in cost.

And if we can bring down our cost, that will do more to widen our utilization of cotton than anything else that we could possibly do.

Senator YOUNG. You have to have both of them.

Mr. BLAKE. That is right, absolutely.

Senator YOUNG. There is no real inconsistency between the two.

Mr. BLAKE. Absolutely. We definitely need all of the utilization research we can possibly get, but we also need, and must have research aimed at reducing our cost of production so we can widen the market for our products.

Sentor YOUNG. Well, if the yields of cotton and wheat and corn were the same per acre now as they were 15 years ago, with present prices and cost of operations, most farmers would be out of business.

Mr. BLAKE. Mr. Chairman, you are so right that I get very much disturbed when I hear criticisms or implied criticisms that what we have been doing in agricultural research is just teaching farmers to grow more and more and more and stock up surpluses.

If it had not been for the research in the last 10, 15, 20 years, that has enabled farmers to increase their yields and lower their unit costs, I do not know any of them who would be in business today. I can guarantee you the cotton farmers would not be in business.

What you said is so true—and we ought not ever to lose sight of it. I think marvelous strides have been made in the research that we have had thus far, by the USDA, by the State experimental stations, as well as by private industry. Much of it has been done by private industry. About half of the agricultural research being done in this country today is being done by private industry. So, let's not lose sight of the tremendous progress we have made while we are looking forward to making still more through this route envisioned in these bills.

Now, I am going to skip over the whole body of this statement with regard to specific examples that illustrate the particular research problems that we have in cotton and how they might be solved, and what it will mean in terms of dollars and cents to this industry. I am going to cut that out—it will appear in the record—and go quickly to this conclusion:

The statement referring to these examples that I have skipped says:

We hope that these examples have made it abundantly clear that the legislation which your committee is considering could make a tremendous contribution to relieving the cotton problem.

The United States Department of Agriculture, and the land-grant colleges are presently making vital contributions in many of the areas we have cited. However, the effort is all too small. In some cases, it falls short because of the lack of the broader authorities which the legislation before you would provide.

There is a real need to maintain and to strengthen the present research-educational setup, and to make full use of the many sincere and devoted scientists who comprise its program. It seems to us that your committee has before it now what are, in effect, recommendations for not only expanding but also for strengthening and making more effective the entire agricultural research effort that we now have in operation.

The administrative organizations suggested by bills before this committee deserve the most careful study.

We strongly urge that your committee consider carefully an administrative mechanism that takes full advantage of the facilities, personnel, and experience of the Department of Agriculture, that we now have, and yet which works to strengthen the USDA research programs and expand their effectiveness.

Your decision on this point may very well hold the key to success or failure in the entire effort.

In summary, these seem to us to be facts of major importance in the matter before your committee:

(1) The soundest way to increase the industrial utilization of farm products is through research which will—

(*a*) Lower cost,

(*b*) Upgrade quality, and

(*c*) Improve processes and products.

All three types are vitally needed.

(2) The biggest, most direct, and most promising opportunities to improve farm income are through increasing the industrial use of farm products which have already demonstrated their ability to compete in these markets.

(3) Both a substantial expansion and a strengthening of Agriculture's present research programs are necessary if the opportunities we can now see in research are to be seized. There is nothing small or insignificant about the problems agriculture faces. Many of those problems can be overcome through research, but the effort must be on a real, all-out scale commensurate with the size of the job we are trying to do.

(4) Building a sound administration for agricultural research takes time and demands sincere support both from within and outside of Government. Great progress has been made in making the programs of the USDA more effective. Any administrative changes that might weaken these vital programs of USDA should be carefully avoided.

Mr. Chairman, we commend you and the members of your committee, and also the authors of the bills before you, for your foresight in recognizing the importance of research as a basic solution to agriculture's problem.

We think that the magnitude of the task before us fully justifies the size of the funds which would be authorized or appropriated in the bills before you.

The problem agriculture has faced in the past, however, Mr. Chairman, as you well know as a member of the Appropriations Committee, was in obtaining appropriations already authorized by Congress.

We hope that your efforts in connection with this matter that is now before you will go far to create a more favorable attitude toward actually making available the funds that are so badly needed, a large part of which have already been authorized and are today authorized in existing legislation.

Thank you very much.

Senator YOUNG. Any questions?

Senator Curtis.

Senator CURTIS. Mr. Blake, we thank you very much for your expression.

Is it your feeling that research is greatly damaged in its progress when we go by spurts and stops, that there has to be a consistency to the program and the funds assured for quite a length of time to do the best job?

Isn't that correct?

Mr. BLAKE. Absolutely. No private company today that has a research program of any consequence operates on any other basis. They cannot get the competent people that they need on any other basis.

Senator CURTIS. Do you have any comment on this provision which I believe was in most of the bills: that we make as a permanent appropriation a percentage of the import duties?

Mr. BLAKE. Senator Curtis, we are very much interested in getting at the point that you just had your finger on, namely, the continuity and stability of appropriation.

We as a group have not reached any conclusion. And I personally have not been able to reach any as to whether or not the use of the section 32 funds would be—or the use of the tariff receipts, as is the case in section 32—would gain for us what you have just described as the objective.

If it would, then surely we would be strongly for it.

I can't help but be bothered, however, by our experience under the Research and Marketing Act. When we passed the Research and Marketing Act in 1946, we got an appropriation for that act, and then immediately we began to see the appropriations for the regular research items cut.

Well, it won't do any good if you are going to take it out of one pocket and put it in another. You see what I mean?

Now, Senator Young being a member of the Appropriations Committee, and one who has been, thank goodness, one of our best friends for agricultural research over these many years——

Senator YOUNG. Thank you.

Mr. BLAKE (continuing). Knows what I am talking about, I am sure; and will realize the difficulty we have had in maintaining these appropriations for agricultural research. And if the Appropriations Committee were to see that we had another source of funds available to us, why, then they might decide that they did not need to appropriate as much through the regular channels.

Now I do not know how we would get at the problem. We do not feel we have a complete answer to it.

If the tariff receipts route is the best way, though, that is the route we are for.

Senator YOUNG. Thank you for a good statement.

The committee will stand in recess until 2 o'clock, and the first witness then will be Mr. Prochaska.

(Whereupon, at 12:50 p. m., the committee recessed, to reconvene at 2 p. m. this same day.)

AFTERNOON SESSION

The CHAIRMAN. The committee will please come to order.

I understand Representative Harvey is present.

Mr. HARVEY. Yes, sir.

The CHAIRMAN. Will you step forward?

Do you want to be heard?

Mr. HARVEY. Yes, sir.

STATEMENT OF HON. RALPH HARVEY, A REPRESENTATIVE IN CONGRESS FROM THE 10TH CONGRESSIONAL DISTRICT OF INDIANA

Mr. HARVEY. Thank you, Mr. Chairman and gentlemen.

I do not have a prepared statement and the statement I offer will be a very brief one.

I want to commend the authors of S. 2306 and to say that I support the objective of this legislation. And I certainly hope that an approach, positive approach will be carried through to conclusion.

I have, in conjunction with the senior Senator from Indiana, in the past introduced legislation to provide for the increased use of agricultural products for industrial purposes and feel that the opportunity that this holds for the betterment of agriculture and our whole economy is certainly very great indeed.

It would seem to me that there is one phase of the program that came to my attention, at least, as a result, I believe, Senator Curtis, of the committee that was set up to make a study of research as the result of an amendment to the Soil Bank Act. In its report and the Chief of our Research Division in the Department of Agriculture, both mentioned that we have had many years now of research; we have four regional research laboratories, one of which is located in your State, Senator Ellender. This report to our House subcommittee stated that many projects were on the shelf, in other words, had been developed so far as the laboratory could proceed with them; that they held the prospect for much advancement but that the advancement would have to come through pilot plants and other programs for development. It is my hope that the Senate Agriculture Committee will give in its hearings as much consideration as possible to this phase of the proposal, and that possibly we might be able to get some more effective work done by way of application than we have had to date.

I believe that is all I care to say, Senator, unless you have any questions.

The CHAIRMAN. No, thank you, Congressman.

We are glad to have had you, sir.

Mr. Prochaska, will you step forward, please?

Will you give your name in full for the record and identify yourself, sir?

STATEMENT OF F. J. PROCHASKA, VICE PRESIDENT IN CHARGE OF PRODUCTION, ENGINEERING, AND RESEARCH, GRAIN PROCESSING CORPORATION, AND KENT FEEDS, INC., MUSCATINE, IOWA

Mr. PROCHASKA. My name is F. J. Prochaska. I am vice president of Grain Processing Corp. and Kent Feeds, Inc., an associated group of companies engaged in production of vitamins, antibiotics, enzymes, alcohol, animal feeds, and processing of soybeans.

The solution of the farm problem presents one of the most pressing and challenging domestic issues facing this country today. I will not waste the valuable time of this committee with presentation of facts and figures showing the importance of agriculture to our national economy, for I am sure that you have heard them many times and can recite them line, chapter, and verse.

However, I very definitely believe that in large measure our present economic difficulties stem from the farm recession starting back in 1955. In spite of some recent improvement in the level of farm income, we cannot expect to maintain an overall stable national economy with one segment of it trying to buy 100 percent or more of parity industrial products with commodities selling for 65 or 75 percent of parity.

Much of the discussion, proposed legislation, and utilization programs relating to agricultural products has been centered about disposal of so-called farm surpluses.

Such efforts, admirable as they may be, are not the permanent long-range solution to the farm problem. We get rid of a particular surplus commodity at a given time only to be faced with some other surplus or the same commodity in surplus at some future time.

Industry will not be interested in carrying out research and development work and making large capital outlays for processing an agricultural raw material whose supply may be nonexistent next month or next year.

Any program to be successful must be based on the utilization of agricultural commodities which will be available in fairly uniform quantities at resonably stable prices over long periods of time and geared to the maximum practicable employment of our productive acres.

The farm problem has many facets and ramifications and all must be given proper consideration. However, I should like to confine my remarks to S. 2306, introduced by Senator Curtis and others, and similar legislative proposals.

Even more specifically I should like to narrow these remarks to the areas of proposed legislation which have been considered in the report to the Congress of the Commission on Increased Industrial Use of Agricultural Products, which Agency I had the opportunity to serve as a member of one of the task groups.

Two conclusions stand out in the report of the Commission:

(1) None of the remedies thus far proposed or employed—price supports, acreage controls, soil bank, subsidized exports, giveaways, et cetera—present much hope for long-range solution of the farm problem.

(2) The only real hope for its solution is an aggressive large-scale expanded program of research, both scientific and economic, for utilization of that portion of the commodities which can be produced on our farms which are excess to our requirements for food, feed, and fiber, and also development of new crops which might replace in whole or part existing ones.

American industry is currently putting 3 to 4 percent of gross sales into research—by contrast agriculture spends not over 1 percent of gross sales on research in total of which only 10 to 15 percent is spent on utilization research.

We have no quarrel with the fact that the extremely large percentage or research funds have been spent on improved and increased production of farm commodities, since until recent times we have traditionally had a pressure of the population on the food basket, rather than pressure of the food basket on the population.

Rather, we need to spend at least as much on production research as in the past and added amounts on utilization research. Certainly we cannot expect to achieve importantly significant results in the field of industrial utilization of agricultural commodities with the niggardly sums that have been supplied in the past.

The potential for development of commercially useful products from agricultural commodities through utilization research is tremendous. Improvement of methods and products related to presently existing techniques for processing of grains presents many opportunities.

Today's processing methods in the milling and fermentation industries are, with relatively minor modifications, basically, the same as have been in use for generations.

For a more specific and detailed listing of research endeavors which hold promise of worthwhile results, I again direct your attention to the Commission's report.

And though, perhaps, it is of no great immediate concern, we should bear in mind that we are constantly depleting our irreplaceable natural resources of oil and minerals, whereas crops grown on the land can be replaced continuously.

I do not profess adequate knowledge to predict the time when these resources will become dangerously depleted or, what is more probable, become exceedingly more difficult and costly to obtain, but the indisputable fact is that these natural resources are being depleted at an ever-increasing rate, and the time may come when ever-recurring plantlife will become the most economic sources of our requirements for fuel, fiber, and construction materials.

How much money should the Federal Government spend on such research?

This is a good question, with many answers, depending on the particular standards which are to be used as a yardstick and the practicalities of the situation.

Various sums have been mentioned, ranging from $50 million to several hundred million dollars annually. The report of the Commission referred to earlier recommends approximately $50 million, whereas, if we attempt to meet industry standards, we should spend several hundred million.

If the source of my information is accurate, S. 2306 (funds 5 percent of total customs receipts) would provide approximately $45 million during the first year, and larger amounts in subsequent years.

I would lean to the lower levels of suggested expenditures during the first year or so of the program, due to the practical situation.

Considerable time will be required to set up the administrative agencies, to plan research programs, and recruit personnel. Therefore, unless sizable sums are to be expended on so-called crash programs, it would be extremely difficult to spend sums intelligently in excess of $50 million during the first year or two.

Furthermore, it would be recommended that no substantial sums of money be spent for new "brick and mortar" during the initial phases of the program, so that maximum dollars and effort be channeled immediately into productive research within existing governmental, institutional, and private research facilities and plants, rather than the much slower approach of building and equipping new facilities, staffing and organizing them, which will require long periods of time before a test tube even gets wet.

Perhaps, and properly so, the question might be asked, "Why, if the potential for use of agricultural commodities is so great, does not private industry get the job done?"

Industrial utilization of agricultural commodities is a most difficult field of research. Industry has pretty well skimmed off the cream in this field already, so that much of the research which needs to be done is of such basic and fundamental nature that the requisite payoff cannot be foreseen or is too far in the future.

We in the industrial processing of grain are woefully ignorant of the fundamental nature of the physical and chemical structure of a kernel of grain. But we cannot prudently justify the expenditures of large sums for research on these problems, which are very remotely removed from some practical application which will produce profits.

The second and, perhaps, the more important reason why private industry will not provide large amounts of money for research on agricultural products is the instability of price and supply, which factors are almost wholly dependent on political considerations.

Today we have corn at relatively low percentage of parity supports—next year or 5 years hence it may be supported at 90 or 100 percent of parity.

Today we have overabundant supplies of corn—next year or 5 years hence we may, through more rigid and restrictive controls, only have supplies adequate to meet existing food, feed, and industrial uses.

Such a political and economic climate is not conducive to a flourishing, privately supported research program.

As has been pointed out earlier, research programs in the field of agricultural commodities are an extremely complex and difficult undertaking.

Regardless of the administrative agency which is set up to handle the program, the greatest care must be used in selecting a capable, experienced, and independent board of industrialists and scientists for screening and periodically reviewing proposed research programs.

Extreme caution must be used to prevent approval of programs which may benefit only small groups, individual companies, or one crop at the expense of another without effecting the solution of the overall problem.

Finally, a word of caution. Engaging in a massive research program, of and in itself, is no guaranty of success in solution of the problem, and particularly for the short-range picture.

You honorable gentlemen will undoubtedly be scratching your heads over some of the same problems for years to come.

However, I feel that it is the soundest approach to the problem—one which, at best, will provide a partial or even complete answer, and, at worst, though not solving the problem, add considerable to the sum total of scientific knowledge which at some future date may be of invaluable aid to our survival as a nation.

In closing, I wish to thank the committee for the opportunity afforded me to present these views, and trust they may be of some aid in your monumental task of arriving at sound legislation in the field of agriculture.

The CHAIRMAN. Thank you, Mr. Prochaska. I notice you are vice president of the Grain Processing Corp.

Mr. PROCHASKA. Right.

The CHAIRMAN. What do you process, sir?

Mr. PROCHASKA. What do we process there?

The CHAIRMAN. Yes.

Mr. PROCHASKA. Well, if I might digress a little bit, the Grain Processing Corp., 1 of the 3 original companies that have been mentioned here earlier. There were 3 built; 1 at Omaha, 1 at Kansas City, and 1 at Muscatine. This is the only one that was operated continuously since it was built, and subsequently acquired by our company. So that it is now owned by Grain Processing and not a burden on the back of the Federal Government.

The CHAIRMAN. Do you make alcohol?

Mr. PROCHASKA. We make alcohol there.

The CHAIRMAN. Out of what grain?

Mr. PROCHASKA. Corn; out of milo; we have made it out of wheat; we have made it out of potatoes, dehydrated potatoes; as a matter of fact, anything, practically, that was so-called surplus at one time or another, we have used.

The CHAIRMAN. How long have you been connected with the manufacture of alcohol?

Mr. PROCHASKA. Well, it is a little—about 15 years now. We started that plant up in 1954.

The CHAIRMAN. To what extent, if any, did you use the facilities or the knowledge gathered from any of these laboratories that we have, the four laboratories, as you know, that we established?

Mr. PROCHASKA. Well, I can mention two items very specifically.

One, we entered into a contract with the Department of Agriculture some 8 or 9 years ago, to develop on a plant size commercial scale work which had been carried on in the laboratory for the use of so-called fungi amyloses for the conversion of starch in the grain, in grain into sugar which has to be done in the process of manufacturing alcohol in place of the oldtime malt which is relatively less efficient. We subsequently did develop that to a plant-sized operation and today use that method exclusively.

Item No. 2, we adopted and since have done more research and development work on a process for the manufacture of the vitamin riboflavin, which was also developed in the so-called Northern League of Regional Laboratory. I don't remember the name of them, now at Peoria.

The CHAIRMAN. Peoria, Ill.?

Mr. PROCHASKA. We are also working on some project in conjunction with them at the present time.

The CHAIRMAN. To what extent in your opinion could these four laboratories be used to carry out the purpose of the act to which you refer?

Mr. PROCHASKA. I think they can be utilized to some extent. I do not think that they have either the facilities or manpower available to carry out a research program such as has been outlined in these various bills and such as I would commend to the committee, due to the fact that they have many other pressing problems within the Department of Agriculture they must take care of. I think the comment has been made in some of the previous testimony here and remarks regarding the fact as to why these laboratories had not done more in the way of utilization of farm commodities, since they had been in existence some twenty-odd years now, as I recall.

The fact is that they periodically are pulled off on one emergency or another, and all during the war period they were pulled off on penicillin and this and that and the other thing and then the time comes along when the Department of Agriculture feels something is much more pressing and so those laboratories are pushed into that service.

The CHAIRMAN. Is there any difficulty because of the lack of scientific help?

Mr. PROCHASKA. Well, that is part of the picture, I would say.

The CHAIRMAN. I notice that you do not favor crash programs, and I am in full agreement with you.

In that respect I understand that the Department of Agriculture has stated on many occasions that they lack the right kind of help, the right kind of scientists to work in these laboratories.

Mr. PROCHASKA. I think that is partly true. I know that industry today, of course, is scouring the country for good scientific manpower in various fields, in physics, chemistry, biology, and so on.

The CHAIRMAN. I am informed that there are quite a few problems that came before these laboratories and had been worked out to the point where they could probably be used in a pilot plant.

Are you acquainted with that?

Mr. PROCHASKA. Well, that is exactly what I was mentioning here a while ago the two particular processes that we took.

The CHAIRMAN. Yes.

Mr. PROCHASKA. As a private corporation, and developed beyond the laboratory or test-tube stage through a pilot-plant stage and subsequently than to an industrial-production stage.

The CHAIRMAN. Would you say that with the four laboratories that we how have in existence, plus some money in order to carry the experiments on in pilot plants might be a good start?

Mr. PROCHASKA. I think that is a start. I question whether it is enough of a start. I think you have got to——

The CHAIRMAN. You are against a crash program. So what kind of a start would you recommend?

Mr. PROCHASKA. I do not mean crash programs but something which is designed for the movement—maybe we have got too much corn, and all of a sudden we dash out madly to try to get rid of X million of billion bushels of corn just to get rid of it. That is not the solution to the program on a long-term basis and that is what I am referring to as a crash program, just something designed to get rid of some existing surplus at the moment and 5 years from now you have got the same surplus again.

The CHAIRMAN. What I though you meant was that if Congress provides enough money we could solve this problem overnight, but of course that is impossible.

Mr. PROCHASKA. I do not agree with that approach.

The CHAIRMAN. No. You would say then that with the facilities we now have, plus money for pilot plants to try to carry out what some of the problems indicate are necessary we will apparently, through the laboratory method, make a good deal of progress in the desired direction.

Mr. PROCHASKA. Yes; plus even some additional money. Private companies could enter into Government contracts.

The CHAIRMAN. I understand.

Mr. PROCHASKA. We have built a new research laboratory within the last 2 years. There would be certain areas in which our company would probably be interested in carrying on research.

The CHAIRMAN. To what extent do you believe that private industry would be willing, with some Government help, to carry through, after a problem has gone through the test tube, that is the laboratory, and made ready for a pilot plant?

Do you think we might be able to work out some way by which we could subsidize, to some extent, private business, say like your company, or other companies, would you think that that would be a good approach?

Mr. PROCHASKA. Speaking for our company, I would say yes, and I think that would probably be true for a good many companies that are in the field of processing in agricultural commodities.

The CHAIRMAN. If that method were available don't you think that you would, in a measure, interest industry, and at the same time probably save the Government quite a bit of expenses in providing machinery and other things?

Mr. PROCHASKA. That is right, I think you are absolutely correct in that.

Senator JOHNSTON. You find some of the big companies are interested in that now in a great many of our universities and colleges, you will find them making large donations to them or grants.

I know Clemson College, we have 1 company there that has given us in present years, last 3 or 4 years, about a million dollars.

It shows you how they are interested in it.

Mr. PROCHASKA. But, as I point out here in my prepared presentation, so many of these things are so far removed, they are such basic type of research, that you cannot justify them on the basis of a private corporation spending the amounts of money any more than some private corporation would have justified the expenditure, if we want to say of both money and particularly use of a design so that eventually you could develop an atomic bomb.

The CHAIRMAN. Those you cannot manufacture overnight?

Mr. PROCHASKA. No, sir.

The CHAIRMAN. It takes time, plenty of time.

Mr. PROCHASKA. Yes, sir.

The CHAIRMAN. Any further questions?

Senator CURTIS. If this question is not proper, I should withdraw it.

Could you give us any idea what it is costing to make alcohol or have you used so many products and gone through an experimental state that you would rather not be pressed?

Mr. PROCHASKA. Well, here, I will make some general statements regarding the problem.

I naturally would not want to divulge specific cost figures for our companies since we have competitors in the business, but when you say how much does it cost to make alcohol, it is pretty general and a broad question. First of all, depending on what kind of facilities you are going to have.

Are you going to have the facilities that are considered essential in the distilling industry, people who are in the business of making whisky, and so on, and so forth.

That is one thing, as against opposed to an industrial alcohol plant which could be constructed rather simply and at relatively nominal cost.

So immediately you get into that problem, how much are you going to amortize your plant or how much plant do you have to amortize over the whole thing?

But getting down to one of the problems that has been kicked around in the press and in the Congress and a good many other places, the matter of making alcohol from grain for use as motor fuel, synthetic rubber, or what have you, I think we should attempt to arrive at some realistic economics in this problem.

Here just recently there was grain sold, not too far removed from our plant from Government bin sites, corn, at approximately $1.12 a bushel basis—what we call No. 2 corn.

On that there was a subsidy of approximately 20 cents a bushel for export. So that gets you down to realizing about 92 cents.

That grain has been in storage something like 3 to 4 years in those Government bins.

Now I cannot put an exact figure on what it costs the Government in these so-called Government bin sites, but the going rate being paid for corn storage is 16 cents a bushel a year.

Let's assume it was stored for 3 years, there is another 48 cents you take off of that 92 cents.

In addition to that there is the interest on the money tied up in that corn.

In addition to that, there is the handling and transportation costs of getting that corn into those bin sites.

In addition to that, there is the deterioration which always results and when you get down to that basis of economics, it is questionable whether the Government realizes 25 cents a bushel out of that corn.

If you are talking about 25 cents corn we can very well make alcohol cheaper than you can get it from petroleum sources.

The CHAIRMAN. Any further questions?

We thank you very much.

Senator CURTIS. One more question.

Do you think that research will lower the costs of making alcohol?

Mr. PROCHASKA. That what?

Senator CURTIS. That research, over the long range, will lower the cost of making alcohol?

Mr. PROCHASKA. Well, I think it has a lot of possibilities, yes. As I said earlier, our methods are about as archaic as they can be. They are essentially—there has been no fundamental exchange in the distilling industry I would say, in a thousand years.

Senator CURTIS. Do you think the idea which has been bandied around by a number of us, that the possibility, protein could be extracted and have a value for human consumption, is worth pursuing?

Mr. PROCHASKA. I think the preprocessing of the grain, perhaps more valuable commodities from it, and just run the starch which is all the distillery is interested in, over to that starcher, conversion plant, starch to alcohol conversion and trying to get more valuable products out of the remaining portion of the grain, some 35 to 40 percent of it, has a lot of possibilities.

Senator CURTIS. With the exception of the fibers, cotton and the like, our surpluses are largely starches?

Mr. PROCHASKA. That is right.

The CHAIRMAN. I have a letter here addressed to me, dated June 3, from Senator Hoblitzell, who asks that that letter be placed in the record at this point.

Without objection, this will be done.

(The letter referred to is as follows:)

UNITED STATES SENATE,
COMMITTEE ON POST OFFICE AND CIVIL SERVICE,
June 3, 1958.

Senator ALLEN J. ELLENDER,
Chairman, Committee on Agriculture and Forestry,
Senate Office Building, Washington, D. C.

MY DEAR SENATOR: I wish to express my wholehearted support of S. 724, introduced by Senator Capehart, and referred to your committee.

In my opinion, this type of legislation is sorely needed by the farmers of our Nation if they are to move forward in step with the other aspects of our national economy.

This bill, providing for a scientific study and research program for agricultural products, is one that could have a profound effect upon the farmers of West Virginia. My State's farmers have been going downhill, economically speaking, for a number of years and many former farmers have found it necessary to seek other means of making a living.

I know that members of your esteemed committee agree with me in the conviction that this movement away from farming must be slowed down and eventually brought to a halt if our Nation is to continue to prosper.

I concur with Senator Capehart in his contention that the only permanent solution of the perennial farm problem lies in greatly enlarged and dramatized research that will develop more industrial uses of farm products.

However, the trend thus far has been in the opposite direction. Industry, spending some $3 billion each year on research, has supplanted a large part of the market which the farmer once had.

For example, synthetics have made great inroads on the natural fibers that come from cotton, wool, flax, hemp, and silk; soap was formerly made from agricultural oils and fats; adhesives come from starch, glue, and plant gum; traveling bags and shoes were made almost wholly from leather; paints from vegetable oils, alcohol from corn and molasses.

It is my firm opinion that industrial uses and new crop avenues which presently afford highly promising opportunities for expanded outlets should be explored and pursued with the fullest resources at our command.

We have spent billions of dollars in attempting to reduce the farmers' production. We have scarcely made a dent in this output.

It is my feeling that it is about time for us to cease taking the negative approach to our farming problems. We must start thinking and acting in a positive manner.

This can be done with the adoption of S. 724 to insure our farmers, including the hard-pressed "men of the soil" in West Virginia, of adequate outlets for their products.

Such outlets can only come through an intensive research program.

With kindest regards, I remain,

Sincerely,

JOHN D. HOBLITZELL, Jr.

The CHAIRMAN. Mr. Hussey, will you step forward, please.

Will you give your name in full for the record and identify yourself, sir.

STATEMENT OF FRANK W. HUSSEY, EXECUTIVE VICE PRESIDENT, POTATO INDUSTRY COUNCIL OF MAINE, PRESQUE ISLE, MAINE

Mr. HUSSEY. Frank W. Hussey, executive vice president, Potato Industry Council of Maine, Presque Isle, Maine, and chairman of the Potato Task Group there in connection with the studies on increasing industrial use of agricultural products.

The CHAIRMAN. Have a seat, sir.

Mr. HUSSEY. I appreciate the opportunity of discussing this proposed legislation, proposing appropriations for increased industrial use of agricultural products.

There are a lot of things that have been said and over and over again in connection with this proposal that perhaps it would not be advisable to repeat, but I am constantly impressed with the need for increased attention to this problem of utilization of farm products in industry.

We know that at the present time that the appropriations by industry in research were roughly 3 percent of their gross sales. In agriculture we have approximately 1 percent of gross sales devoted to research.

In the past two decades that a large part of the present production in industry are new products that were not in existence 20 years ago, and we know that approximately half of the fibers used today are synthetic fibers, that two-thirds of the present shoe production is not from leather, and that roughly two-thirds of the products used in soap manufacture are not from agriculture, that were originally animal fats.

The CHAIRMAN. Well, that shows what research has done; does it not?

Mr. HUSSEY. That shows what research has done for industry.

The CHAIRMAN. If we go too far with that, what will be the result?

Mr. HUSSEY. Well, we believe that agriculture has a challenge to carry on research programs that will protect the interests of agricultural producers to see that these products of the farms are used in industry instead of being displaced in industry.

The CHAIRMAN. Well, we had some testimony here about 3 weeks ago, I think, it was Congressman Jensen from Iowa, who had a bill and he proposes to make alcohol out of grain and potatoes and what have you, and then force the oil producer to use some of that to be mixed with gasoline.

You would not want that; would you?

Mr. HUSSEY. I am——

The CHAIRMAN. I am just asking you or would you want it?

Do you think that is a good approach to it?

Mr. HUSSEY. I would think it would be a good approach.

The CHAIRMAN. I disagree.

Mr. HUSSEY. I can appreciate that, Senator.

I think at least we should, with the complications in the world situation, and with imports of oil we should know more about the utilization of farm products as a fuel.

Senator JOHNSTON. If it would bring a more powerful gasoline you would want it; would you not?

Mr. HUSSEY. Well, I think it is very desirable to know, to find ways and means of utilizing farm products in fuel production.

Whether it is used now or later is another point.

We may be facing disaster from the standpoint of the import of fuels due to the world situation and we had better know of the possibilities of some recourse.

But that is not my main objective in testimony.

The CHAIRMAN. When I stated that I did not agree, I did not want to be misunderstood.

Mr. HUSSEY. No.

The CHAIRMAN. I happen to come from a State where we produce a lot of gas and oil.

Mr. HUSSEY. I know you do, Senator.

The CHAIRMAN. However, my objection is based on this proposal that would force a manufacturer to use products in order to get rid of them. That is what I object to.

Mr. HUSSEY. That is a different story, I would object to that too.

The CHAIRMAN. That is what I had in mind, sir.

Mr. HUSSEY. From the research standpoint.

Senator AIKEN. I think they do use alcohol in some of the blended fuels, Senator.

I do not think I would go along with requiring them to use a certain percentage by law.

The CHAIRMAN. That is what I was opposed to.

Senator AIKEN. If through research we can do it—it pays them to do it, and they get a more powerful fuel which helps everybody, that is something else.

Mr. HUSSEY. That is a possible alternative in the event that fuel supplies are short.

The CHAIRMAN. Yes.

Mr. HUSSEY. I think we sometimes give too much attention to the industrial use of farm products in thinking about this proposed legislation and not enough to increased utilization as food products.

That we know that there are—there is a great need for upgrading the American diet and that certain food products can be utilized to much greater advantage than is now being done, and that increased research needs to be done in that direction with that approach.

And I would hope that this legislation could be amended to that effect, that we not only are concerned with industrial use but we are concerned with increased use in whatever feasible means to employ——

The CHAIRMAN. I imagine that would naturally follow.

Mr. HUSSEY. It would but I think it should be spelled out in legislation and not taken for granted.

Senator JOHNSTON. No one knows but there might be a great many vitamins in some of the things that we are throwing away.

Mr. HUSSEY. That is right.

The CHAIRMAN. That is right.

Mr. HUSSEY. Historically research, much of our agricultural research has been for increased production, and the emphasis has been, to my way of thinking, concentrated too much in that direction and I think we need to give a great deal more attention to utilization and merchandising and marketing of our farm products, and that this legislation offers a real opportunity to develop that approach.

Now——

The CHAIRMAN. I notice here you are interested in potatoes, Irish potatoes?

Mr. HUSSEY. That is right.

The CHAIRMAN. At Presque Isle?

Mr. HUSSEY. Yes.

The CHAIRMAN. I was there in 1920, at your experimental station there. It may be if you can take the starch out of potatoes you might get more ladies to eat potatoes.

Mr. HUSSEY. Well, the starch is the product we want.

The CHAIRMAN. I say, is that what you have in mind?

Mr. HUSSEY. No.

The CHAIRMAN. What I mean is this: Take a food like potatoes, would you want to extract something out of that in order to put in some other food; is that your idea?

Mr. HUSSEY. No.

The CHAIRMAN. Tell me what you have got in mind.

Mr. HUSSEY. No, it is the utilization of potatoes as a starch as a good source of starch. The starch cell itself has untold possibilities in industry, and as a food, and where medical research is finding that potatoes are a very important part of a well-balanced diet.

The CHAIRMAN. I thought that that was done now, they have experimented with it quite a bit.

Mr. HUSSEY. Yes; that is right.

The CHAIRMAN. We had some starch factories in my own State that extracted starch from sweetpotatoes.

Of course, they did not stay in business so long but we had starch. I am just wondering about the extent to which you could make them stay in business unless you made it profitable to them.

Mr. HUSSEY. Well, the starch business in Maine is and has been developing and they have been manufacturing better products used in industry, for example, the paper industry is using a great deal of starch today and the textile industry, of course.

It is largely a matter of location of starch factories where there is a volume, big volume of production.

Industrial use as a starch or in alcohol of either potatoes or some other starch source means a low price to the producer under present conditions.

But I firmly believe that better understanding, gained through research in utilization of the starch cell, of the starch—we know very little about the components of the starch cell, in either potatoes or corn, or other products, and that research will bring out some uses that we have not dreamed of yet.

The CHAIRMAN. You mean of the starch?

Mr. HUSSEY. Of the starch, yes.

So it goes in other products and I am not speaking from the standpoint of potatoes alone but from the standpoint of all other agricultural products.

The CHAIRMAN. I understand, yes.

Mr. HUSSEY. I think not to be ignored is the importance of increased research and utilization both in industry, as a food and in employment.

We are finding, for example, to cite the case that you mentioned, our starch factories are employing quite a sizable number of people, not only in the manufacture of starch but supplying materials to it and that, of course, would be true of all other farm products also.

So I would like to emphasize, first, that the amount of money that is devoted to agricultural research in utilization and marketing is very small. That industry has been carrying on a big research program, new products are coming on the market, many of which replace agriculture products, sources in agriculture, and that we, from the standpoint not only of investment, not for the sake of spending money, but for investment in the future of agriculture in this country, we have been spending roughly, I believe these figures are correct, $22 billion since the farm program started back in the thirties, and it has been for the most part to date, spent in terms of current problems, in trying to remove surpluses or improve agriculture currently but we have yet to spend a great amount of money, any sizable amount of money as an investment in the future.

Now this is not spectacular. There is something that will require perhaps 10 or 20 years to see the results, but it is an investment in

meeting this agricultural problem of surpluses that we face here 10 and 20 years from now which many of us believe to be sound and holds a great deal of promise.

The CHAIRMAN. What do you think of the proposal that was made this morning by one of the witnesses to the effect that inorder to reduce our surpluses, say like potatoes, instead of planting potatoes you plant something else that could be manufactured and in that way reduce surplus and at the same time utilize the land in other ways?

Mr. HUSSEY. If we can find these other products that is fine. We are concerned with maintaining stable agriculture.

The CHAIRMAN. That of course would take a long time to attain, I presume.

Mr. HUSSEY. That is right. I think that that illustrates the fact that this proposed legislation is an investment program rather than a relief program. It is investment in the future.

The CHAIRMAN. Would you relegate the studies to some ways and means to develop better uses of the products we are now growing rather than go into the field of finding other crops to grow and in that way reduce our surpluses?

Mr. HUSSEY. I don't think there should be any limitations, any fencing in. I think we should not only find better uses of present products but also find new products that can be used.

The CHAIRMAN. Substitutes. Yes.

Mr. HUSSEY. That, basically, is my testimony, sir.

I appreciate this opportunity to meet here. I do hope that we will find ways and means in giving increased attention to this problem of industrial use and food and I would hope that the legislation would be amended to include food as well as industrial use.

The CHAIRMAN. I hope that this committee will be able to present a bill that will be acceptable to Mr. Benson and the President, and if we can do that why the chances are we might be able to do something. But with an adverse report, you know, as we have on these bills, all three of these bills, it is my judgment that whatever we do here may not be acceptable to 1600 Pennsylvania Avenue.

Mr. HUSSEY. Well, I cannot do anything about that, but I do hope you pass appropriations. [Laughter.]

The CHAIRMAN. That is the political part of it.

All right.

The next witness is Mr. Greene.

Will you step forward, please?

STATEMENT OF ERNEST W. GREENE, PRESIDENT, SUGAR ASSOCIATION

Mr. GREENE. My name is Ernest Greene. I was chairman of the Task Group on Sugar under the President's Commission, and I am authorized to appear in behalf of the members of that task group.

I have spent almost all of my working life in the cane-sugar industry; more than 40 years of it, with the Hawaiian sugar industry in one capacity or another, up to the time that I was retired for age in 1956.

The CHAIRMAN. You do not mean that, do you, retired for age?

Mr. GREENE. They looked in the almanac. I am still president of the Sugar Association in New York, which has its principal office in New York and operates the sugar research foundation.

If I may, I would like to proceed with this statement, sir.

The CHAIRMAN. Yes; indeed.

Mr. GREENE. I appear before you to urge the enactment of legislation of the type covered by the bills which are now before you, legislation which would develop research for the finding of new industrial uses for agricultural products, the development of new and improved processes and by all means it should include basic research and pilot plant work in order to at the one end discover new ideas; at the other end to adapt for commercial use the results of any such research.

I am naturally interested in that for all farm products but I will just talk about sugar and the byproducts of the sugar beet and sugarcane which is the subject I know best.

Sugar is a pure carbohydrate and as such it lends itself readily to chemical manipulations. It is in plentiful supply; it is inexpensive, it is uniform in quality and may be stored for long periods.

It has characteristics that make it advisable to explore thoroughly all of the possibilities for its utilization as a raw material for industry or as an ingredient of useful nonfood, industrial, and chemical products.

A number of promising fields have already been developed, and identified through studies that have been conducted by the Department of Agriculture and other agencies of the Government, by universities and colleges, by companies within the industry, and since 1943 by the Sugar Research Foundation which is a nonprofit organization supported entirely by the sugar industry itself.

And they have developed a number of promising potential uses.

We feel we now need an accelerated and intensified program of research and commercial adaptation such as would be provided by the legislation under consideration.

I would wish to emphasize at the start, and say in my statement, that this is not an alternative to or a substitute for the tremendously valuable research, on production, plant improvement and in other fields which has been carried on for three-quarters of a century by the Department of Agriculture and has been of such great benefit to agriculture and consumers of agricultural products.

We feel that should go on, and go on full scale and, if possible, increased. But this utilization research is a new field, the surface of which has barely been scratched with all the work that has been done on utilization of agricultural products, particularly in sugar of which I am speaking, and it deserves the devotion of funds and scientific effort, and brains to the development of these new uses and to means for their commercial adaptation.

The CHAIRMAN. Mr. Greene?

Mr. GREENE. Yes, sir.

The CHAIRMAN. I wonder if you would be able to give us an idea of the effect that it would have on private industry, in carrying on its own experiments, if the Government were to get in and undertake the task.

Mr. GREENE. I think we would—private industry would be encouraged to further effort and to complete cooperation with the Government in any such work to develop by research and commercial adaptation new uses of sugar.

The CHAIRMAN. Well, you heard me suggest to a witness a while ago that it may be possible to, rather than have the Government to establish pilot plants over the country, use facilities already in exist-

ence and owned by private industry by probably subsidizing them to some extent to carry on experiments for the benefit of the Government.

What would you think of that?

Mr. GREENE. I think wherever that could be done it would be commendable. I think there would be limitations on that, because, after all, a private industry has to keep going with its business in order to make earnings and remain in business, and if the pilot-plant operation were such, and pilot-plant operations may be of such a nature, that it would considerably disrupt their regular commercial operations, and the production of their products, then it would be difficult to do it in a private plant. I think there are limitations as to what can be done in a private industry plant, Senator. Certainly the industry I am certain would cooperate to the extent of its ability to do so.

The CHAIRMAN. Proceed.

Mr. GREENE. As you know, when you are harvesting sugarcane and grinding it you really have to keep going.

If you stop and carry on a pilot-plant experiment for new processes, it might considerably disrupt the regular operation.

The CHAIRMAN. Well, the thing is this, in the sugar industry as you know, take in Louisiana, as you know you have facilities that cost millions of dollars that they use only 3 months in the year and the rest of the time they are doing nothing.

Mr. GREENE. Certainly in the off season and at other times during the season. I only meant to the extent the industry could do it.

The CHAIRMAN. Yes, I understand it.

I believe it would be to the advantage of both, the Government as well as private industry.

Mr. GREENE. Yes, sir.

The CHAIRMAN. To undertake to do that because, after all, it is their money that would be used to a large extent to carry these experiments on and if we could save money by using facilities that they have, such as excess steam they might have in a plant.

Mr. GREENE. Yes.

The CHAIRMAN. Where steam is necessary, utilize that rather than get the Government to build an entirely new plant, that is what I had in mind.

Mr. GREENE. By all means.

I would say that we certainly should use the existing Government laboratories to their full extent and we should utilize the facilities of private industry to its fullest extent before we would advocate putting money into new equipment or new buildings.

Of course I believe, sir, there would be a new problem of the authorization of an agency or the Department to do this work with private industry because there are limitations of law at the present time as to the methods of handling these cooperative projects.

The CHAIRMAN. I know that could be done, the same as we do in other things, by contract.

Mr. GREENE. Yes, sir.

The CHAIRMAN. Pay so much for the service. We do that in experimenting on airplanes and things like that. We get factories already established to carry on experiments for the use of the Government, and I do not see why the same thing could not be done with respect to the manufacture of industrial products, find new uses for them.

Mr. GREENE. Yes, sir.

Of course, I must make it clear I am merely giving my own opinion. I have not been specifically authorized to speak——

The CHAIRMAN. I understand.

Mr. GREENE. For anyone in the sugar industry on that point.

The CHAIRMAN. I am asking that question of you as an individual. Forget about who you represent.

Mr. GREENE. Yes, sir. Answering it as an individual, it makes good sense.

Senator AIKEN. Where is the greatest need for utilization of research in the sugar field? Is it in the sugar itself, in bagasse, or beet pulp, or where?

Mr. GREENE. There is a field for research there, but I think the great need for utilization research is in the use of sugar as a raw material or as an ingredient for chemical products where it is not now used.

Senator AIKEN. In the field for the sugar itself. What percentage of the fiber is used for furfural and other purposes?

Mr. GREENE. Well, I cannot give you the percentage. There is one, as I say in my statement, large American-owned company in the Dominican Republic which produces furfural in very considerable quantity—and I understand the plant is to be enlarged—and that is used by one of the largest producers of what is called 6–6 nylon.

There is a company in Louisiana, as you know, Senator, which is very successfully manufacturing paper.

The CHAIRMAN. Celotex Co.

Mr. GREENE. Celotex Co., and also the Valentine Co. and its connections.

The CHAIRMAN. Just about 20 miles from where I live.

Mr. GREENE. Yes, sir. And also, that Louisiana company supplies a plastic molding compound to a commercial user, and I understand a good deal has been used in some phonograph records.

There is a new plastic developed by that same company which is largely composed of sugar, and I saw some which would make very handsome and useful pot handles and things in connection with household and kitchen utensils, just the other day.

The CHAIRMAN. I understood they use it also as a detergent in some soap manufacture.

Mr. GREENE. That is another use that I cover here.

The CHAIRMAN. Yes.

Mr. GREENE. There has been developed by some work done by the Sugar Research Foundation a detergent which is composed of fatty ester acids, which combines sugar and natural fats and produces a detergent which gives great promise of having many uses which would make it superior to any detergent now on the market, because it is made of two foods, and that in itself has an advantage. There are two companies, one of them with a plant in Louisiana and one elsewhere, which are now in the final stages of commercial adaptation of that product.

We hope and believe that very soon they are going to be in considerable scale commercial production of that product.

There is one other plant which has produced a slightly different type of detergent, which is manufactured principally from sugar, and so there is great hope of these developments. But while the pre-

liminary research work has been done to establish the fact that there are possibilities, there are a number of fields for research in connection with sugar and the byproducts of sugarcane and sugar beets which the scientists who have worked on those projects feel justify, on the basis of what is now known, a considerable extension of research work.

And the industry, through its Sugar Research Foundation, through the individual companies, is somewhat limited as to the amount of money it can devote to that purpose, or does so devote, and we feel that the impetus and the prestige which would be given by a Government program such as is contemplated by these bills would accomplish results both in the near future and in the long term.

The CHAIRMAN. Well, Mr. Greene, your entire statement will be put in the record.

Mr. GREENE. Yes, sir.

I ask, in this statement, whether the report of the task group on sugar, which goes considerably more in detail, which you have before you, may be made a part of the statement.

The CHAIRMAN. It will be filed for the use of the committee, because we do not want to burden the record with too many reports.

Mr. GREENE. I think that it would be useful to you, Senator.

The CHAIRMAN. I understand. But we have, as I understand, copies of each task force report.

Senator CURTIS. They never have been printed.

The CHAIRMAN. They were submitted this morning, as I understand it.

Senator CURTIS. Yes; but they are not in printed form.

Senator AIKEN. Of course, the research work on sugar and its byproducts could well receive cooperation of other countries, too, because sugar could be very easily produced over there; probably produced cheaper than we could do it here.

Mr. GREENE. The encouraging thing there, Senator, is that, in a number of these promising prospects for sugar, I am assured by the scientists who are working on them and who have made some economic evaluation, that sugar at the domestic price could profitably be used in the production of some of these products which we suggest here, if not in all of them.

And I do feel, sir, that the emphasis which has been laid on basic research and on the pilot-plane work is essential, because some of these things have come to the point where they look most promising, but are not apt to be taken up by any company until there has been a certain amount of commercial adaptation work done.

The CHAIRMAN. Thank you, sir.

Senator AIKEN. Sugar could be produced much more economically in many parts of the world.

Mr. GREENE. Well, it could be produced at a lower price, but those of us who have been in the domestic industry all our lives have our own definition of what "economically" means in terms of the welfare of a country.

Senator AIKEN. You were referring to one country where practically all the fieldwork is done by bull power yet, and if they could get tractors in there they could produce it for a lot less, but it would put people out of work, of course.

Mr. GREENE. Well, it would, of course. I go back far enough to the days when we used to do practically all of our fieldwork with mules

and horses, and we had the first tractors. They used to have a saying then that the Holt was better than the Best, but the Best was not too much good. If you had 3 tractors, 1 of them in the field and 1 being repaired in the shop, and 1 on the way between, you were doing very well.

The CHAIRMAN. Thank you, Mr. Greene.

(Mr. Greene's prepared statement follows:)

My name is Ernest Greene. I was Chairman of the Task Group on Sugar under the President's appointed bipartisan Commission on Increased Industrial Use of Agricultural Products, and I am authorized to appear before you in behalf of the members of that task group. A list of the members is appended hereto. Almost all of my working life, until I was retired for age in 1956, was spent in the cane sugar industry, more than 40 years of it in 1 capacity or another with the Hawaiian sugar industry. I am still president of the Sugar Association, which has its principal offices in New York, and operates Sugar Research Foundation and Sugar Information.

I appear before you to urge the enactment of legislation of the type covered by the bills which are the subject of this hearing, and which would make effective and adequate provision for efforts to develop new industrial uses of agricultural products, and new and improved processes for industrial utilization of such products, including basic research, pilot-plant tests, and other activities designed to bring about commercial acceptance and utilization of the results of any such research and related activities.

I am interested in such research for all farm products, but I shall confine my statement to sugar, and the byproducts of the sugarcane and sugar beet, which is the subject I know best.

Sugar, the product of the sugar beet or sugarcane, is a pure carbohydrate, and, as such, it lends itself readily to chemical manipulations. It is in plentiful supply, inexpensive, uniform in quality, and may be stored for long periods without deterioration. Sugar has a low molecular weight and is highly soluble in water. Its characteristics make it advisable to explore thoroughly all of the possibilities for its utilization as a raw material for, or an ingredient of, useful nonfood industrial and chemical products.

A number of fields in which sugar research will be most likely to be productive have already been identified through studies conducted by various agencies of the Federal Government, by universities and colleges, by companies within the industry, and, since 1943, by Sugar Research Foundation, which is a nonprofit organization entirely supported by the sugar industry itself.

Among such promising potential uses are surface coatings, plastics and plasticizers, agricultural chemicals, surface active agents, fibers and films, solvents and adhesives.

What is needed now is an accelerated and intensified program of research and commercial adaptation such as would be provided under the bills which are now before you.

I wish to emphasize at the outset that the program of research on industrial use is not in any sense to be considered as an alternative to, or a substitute for, the research on production, processing and marketing of farm products which the Department of Agriculture has carried on so effectively for three-quarters of a century. The Department's research programs, which have been of incalculable benefit to farmers, and to the consumers of farm products, should not only be continued without interruption, but should be expanded wherever possible.

The research which is now proposed, and which I most earnestly recommend, is in a new field, the surface of which up to this time has only been scratched, but which has been explored sufficiently to indicate that it may provide the long-term and the profitable solution of the farm-surplus problem. Even though sugar is not a surplus crop the additional production which may be needed to supply increased industrial use would reduce the pressure of other crops which are presently in surplus supply.

The Task Group on Sugar was composed of men whose experience covers the whole range of the sugar industry—research, farm production, processing, technology and development. They prepared a report which presents in one document valuable information in the field of industrial use of sugar and its byproducts, some of which is new, and much of which was hitherto available only by digging it out from widely scattered sources. Most importantly, it lays out in some detail, and recommends, with estimates of costs, programs of research which are deemed

to offer the best prospects of success, both in the nearby future and in the longer term, for the development of new, large-scale outlets in the industrial uses of sugar and its byproducts. It also stresses the need for more programs of basic research, which will have potential value for all agricultural crops, and the need for greater and more available facilities for pilot-plant testing and commercial adaptation.

The report of the task group is submitted herewith, as an appendix to, and a part of, this statement.[1]

PRESENT INDUSTRIAL USE

There is every reason to believe that sugar and its byproducts are slowly, but steadily, expanding their present use in the industrial nonfood field, For example:

One company in Louisiana supplies to a commercial user considerable quantities of plastic molding compound which is manufactured from bagasse, the residue of the sugarcane after it has been milled. The same company has developed a plastic material the principal ingredient of which is sugar.

A large chemical company in Tennessee is marketing successfully sucrose-acetate-isobutyrate as a plasticizer. The principal component is sugar.

A sugar company in the Dominican Republic supplies furfural manufactured from bagasse to a large producer of 6–6 nylon.

Two companies in the United States are at the stage of final commercial adaptation of sugar-fatty-acid-esters, which appear to have possibilities for large-scale use as detergents and otherwise. Another large chemical company is producing on a commercial scale a propylene-oxide-addition compound, manufactured principally from sugar, as a detergent.

Other companies in various localities are producing and marketing successfully paper and paperboard from bagasse, aconitic acid from molasses, and citric acid from molasses.

It is known that some sugar is used in pharmaceuticals, in dyestuffs, and in explosives. There are probably other current uses, but there are no statistics available to indicate the quantities of sugar thus used. The present uses serve to indicate the possibilities for significantly large scale industrial outlets for sugar in the future, provided that the necessity research can be carried on expeditiously and on an adequate scale.

The dearth of definite information in regard to the actual quantity of sugar which is now used in industry is due to the fact that much of the sugar for such use is sold by local brokers and wholesalers without knowledge of, or any record of, the end use of such sugar. The task group endeavored to gather some such information, but did not have the means nor the time to assemble any significant data. It is recommended that the Bureau of the Census be requested to collect data on the industrial use of sugar in its next Census of Manufacture. This information would be of great value to the administrative agency which would be set up under the provisions of the bills under consideration.

EXISTING RESEARCH PROGRAMS

The report of the task group contains a thorough survey of existing research programs covering potential nonfood and nonfeed industrial uses of sugar and its byproducts, as well as a bibliography of the publications in which the complete reports covering the projects may be found.

The Agricultural Research Service of the United States Department of Agriculture has carried on research in the area of basic composition of sugarcane, sugar beets and the byproducts of processing; the development of processes for manufacture of paper and board from bagasse; the production of plastic molding compounds from bagasse; the development of improved methods for the fermentation of molasses to produce citric acid and clinical dextran; studies on the preparation of unsaturated ethers and mixed ethers of sugar, which are potentially useful in plastics and plasticizers; pilot-plant work on allylsucrose; studies of molasses as a source of several organic acids, and studies in the extraction and composition of wax recovered from clarification residues.

Only one research project was found among the State agricultural experiment stations. It covers microbiological studies on the utilization of molasses.

In the category of nonprofit, private and other laboratories the principal program is that of Sugar Research Foundation, Inc. Since the year 1943 it has made 152 grants-in-aid for the support of research carried on in universities and private laboratories, of which 48 grants have dealt with nonfood and nonfeed subjects. The 48 grants have covered projects in the areas of fermentations;

[1] The report is on file with the committee.

sugar byproducts; plant nutrition; and, under the head of sucrochemistry, glucose derivatives, oxidations of sugars, degradations and derivatives of sucrose.

At Louisiana State University a research program has been in operation since 1946 on procedures and equipment for removing pith and dirt from bagasse to be used in the manufacture of paper or board. The program also covers the handling and preservation of bagasse with maximum economy.

Thirty-two out of seventy-nine research institutes affiliated with colleges and universities replied to inquiries from the task group. Six of them indicated that some study of nonfood uses of sugar and its byproducts had been made, aside from projects sponsored by Sugar Research Foundation.

A review of research programs serves two useful purposes; first, it points to those general areas in which future research is most likely to succeed; and, second, it cautions against the further expenditure of funds and efforts in fields which have proven to be barren. Not all projects can be expected to yield favorable results. If the end results could be accurately foreseen it would not be research. The "blind alleys" of research are an inescapable part of progress.

POTENTIAL INDUSTRIAL USES

The nine fields in which there are the greatest opportunities for nonfood uses of sugar were reported by the task group as follows:

Surface coatings.—Some years ago a process for manufacturing allyl-sucrose from sugar was developed at the Eastern Utilization Research Branch, Agricultural Research Service, USDA, under grant from Sugar Research Foundation. It failed of commercial acceptance at that time because of the high cost of the process. New techniques have been developed which give promise of lower costs. There is no question of the superior quality of the product if it can be produced at reasonable cost. The present day possibilities of allyl-sucrose, and other promising developments in the field of surface coatings, need further research and development.

Plastics and plasticizers.—Sucrose offers distinct opportunities in the production of plastics and plasticizers. Its ethers, its esters, its degradation products, as well as its acid derivatives, all have shown promise, and, as mentioned above, there have been some commercial developments, but much further research is needed for the full development of the possibilities in this large field.

Agricultural chemicals.—There are promising prospects in the areas of pesticides, fertilizers, and soil conditioners which await further research.

Surface active agents.—A process which shows much promise for the successful production of sucrose-fatty-acid esters is in what appears to be the final stage of commercial adaptation. The product has possibilities of large-scale use in detergents and otherwise. Other possible sources of the lipophilic ends of the molecules which constitute these detergents need and deserve further research.

Fibers and films.—There should be further research on the manufacture of alpha-cellulose or dissolving pulp from bagasse, and the studies should be carried through the stages of pilot plant work on a scale large enough to simulate commercial processes. Polymers produced from sugar or the byproducts of sugar are other potential sources of fibers and films.

Paper, hard board, insulating board, and corrugating stock.—Each of these products is now being produced commercially from bagasse in various parts of the world. However, further research and extensive pilot plant work is needed with the objective of evaluating and improving the processes which are now in use.

Solvents.—The possibilities of sucrose as a solvent are limited by its high melting point and the strength of its hydrogen bonds. However, decomposition of sucrose by reductive aminolysis, and other reactions, offer possibilities of offsetting these disadvantages. Further research is needed and recommended.

Explosives.—Sugar and bagasse are now used to some extent in the explosives industry. Alphacellulose would be valuable as a source of nitrocellulose. Further research is needed.

Adhesives.—This subject deserves further research.

RESEARCH RECOMMENDED

The task group recommended immediate action with respect to 21 research projects, as follows:

Eight of the research projects recommended are in the category which may be expected to develop sizable industrial consumption reasonably soon—for example, within 5 years.

Thirteen projects were recommended as longer range possibilities with potentials for industrial use on a large scale.

The estimated cost to complete the 8 shorter term projects is $2,775,000.

The estimated cost per year for the 13 longer term projects is $420,000. Some of the projects might have to be carried on for 10 years, others might come to a successful conclusion much sooner than may now be anticipated, and still others might prove to be so unpromising that they would be abandoned after a period.

Basic research should be provided on a generous scale in an effort to find the answers to questions presently unanswered, and in the hope of turning up new knowledge of the possibilities of utilization of agricultural crops.

Ample facilities should be provided and made available for pilot plant and commercial testing.

The foregoing lists of projects and possibilities are intended to show the great potential for utilization of sugar and its byproducts which lies ahead of us, and which awaits more research effort. I do not presume to forecast the lines of work which might be selected by the administrative agency to be set up under the proposed legislation. I do say, with complete conviction, that there will be a number of promising lines of work to be followed, and I will hazard the prediction that the problem of the Administrator will be the selection, among many attractive possibilities, of the projects on which the available funds are to be expended.

CONCLUSION

I quote from the summary of the report of the task group, as follows:

"The Sugar Task Group's proposals reflect the conviction of the sugar industry that new, large-scale, nonfood uses of its products are a certainty—a conviction based on 14 years of research sponsored by the industry, which has demonstrated several rewarding opportunities. There is no need to grope for starting points, since a score of promising leads have been developed. The goals are evident, and the adoption of the proposals embodied in this report will speed their realization. The results cannot fail to benefit not only the agricultural economy of the United States, but world commerce as well."

Failure to carry on research entails the penalty of atrophy. The sugar industry through its contributions to the Sugar Research Foundation, and by its encouragement of research by others, has demonstrated its faith in the value of this form of the pursuit of knowledge. I believe that the day of large use of sugar and other agricultural crops by the nonfood industries will be dramatically brought nearer if the Congress, by enacting the proposed legislation, enables the Government to devote its resources and lend its prestige to the furtherance of the work which I have described in this statement.

I am not a scientist—my part in the sugar industry has been engineering, production, and executive work. However, I have always had a deep interest in research and all phases of the technology of sugar, and I have been fortunate in having, especially in recent years, a close association with research activities. I believe that the full potentialities of sugar research are just beginning to be recognized, and that the prospects appear to be just as encouraging as those which faced the petroleum industry 30 years ago, and which made possible the great petrochemical industry. If adequate research is provided, the next decade may well see the parallel development of the sucrochemical industry.

I most earnestly recommend the enactment of legislation to accomplish the purposes of the bills which are the subject of this hearing.

MEMBERS OF THE TASK GROUP ON SUGAR UNDER THE PRESIDENT'S APPOINTED BIPARTISAN COMMISSION ON INCREASED INDUSTRIAL USE OF AGRICULTURAL PRODUCTS

Ernest W. Greene, Chairman; President of the Sugar Association, Inc.
Robert H. Shields, secretary; president of the United States Beet Sugar Association.
H. Malcolm Baldrige, general counsel of the United States Cane Sugar Refiners' Association.
Harry Clark, farmer, sugar beet grower, and president of the National Beet Growers' Federation.
Josiah Ferris, vice president of the American Sugar Cane League.
Dr. John Hickson, assistant to the president, Sugar Research Foundation.
Edwin Hungerford, director of research and development, Great Western Sugar Co.
Victor L. Johnson, vice president, the American Sugar Refining Co.

Dr. George O. Kohler, Western Utilization Research Branch, Agricultural Research Service, USDA.
Dr. George P. Meade, coauthor of The Spencer-Meade Cane Sugar Handbook.
Slator M. Miller, vice president of the Hawaiian Sugar Planters' Association.
Dudley Smith, vice president of the Association of Puerto Rican Sugar Producers.
Consultants to the Task Group on Byproducts:
Dr. Leonard Baver, director of the experiment station of the Hawaiian Sugar Planters' Association.
George Aljian, vice president, California & Hawaiian Sugar Refining Corp.
Neil Kelly, assistant secretary; vice president, Sugar Information, Inc.

The CHAIRMAN. I understand Congressman Dixon, from Utah, desires to file a statement for the record.

STATEMENT OF HON. H. A. DIXON, A REPRESENTATIVE IN CONGRESS FROM THE FIRST CONGRESSIONAL DISTRICT OF UTAH

Mr. DIXON. If I might have permission. And may I make a statement, too, about 4 minutes in length?

The CHAIRMAN. Yes, indeed.

Mr. DIXON. Mr. Chairman and gentlemen, my experience in administering research programs has developed in me almost unlimited faith in the power of research to transform our present picture. I have seen it year after year at work. It does not come dramatically like taking a rabbit out of a hat. It comes a bit slowly but surely.

As Shakespeare said:

> How poor are they who have not patience; what wound is ever healed but by degrees. Thou knowest we learn by wit and not by witchcraft, and wit depends on dilatory time.

Research takes a bit of time, but it gets the results. I view utilization research as one of the permanent solutions to our farm problem, and I am on the Committee of Agriculture in the House. I believe these Federal supports have their place to a limited extent, but they are a bit like aspirin or bufferin—they relieve the pain but they never cure the patient.

The legislation you have here is something which will cure the patient, if we give it a chance.

It is as refreshing to me to see your interest as one of our cool mountain breezes, because you are definitely on the right track.

May I say first that production research has achieved miracles, but I guess production research is quite largely responsible for many of our price-depressing surpluses. I know from experience that marketing research and utilization research can accomplish just as miraculous results as production research if we give it the opportunity through passing these bills.

I cannot understand why we have gone so long with this blind spot, going all out for production research and neglecting marketing and utilization research. I know that nearly all of our research people were for production research, and very few for marketing research, utilization research or the discovery of new crops.

This neglect is a serious blind spot in our whole agricultural picture; namely, the lack of emphasis upon research for new crops and utilization research as such.

I will file my entire statement, as you have given me permission, but I would like to speak for just a minute or two upon the question of the agency which should administer this legislation.

As I understand a separate administration agency is recommended in all three bills before the Senate. From my point of view that is entirely wrong. I believe the agency should be the Department of Agriculture.

I believe the President's Commission on Utilization Research gave us alternatives. While it did lean a bit toward a separate agency, the other alternative suggested was the Department of Agriculture as the administering agency, and that is the position I desire very much to support.

My reasons are, first, the Department of Agriculture has the tie-in with the land-grant colleges. All of our land-grant colleges in the United States and their association stand behind this second position; that the Department of Agriculture should be the administering agency.

Second, I have letters saying that this is a good movement, one from our Manpower Commission, but that we have not the scientists to operate it. I do not think a separate agency will develop the scientists to operate it. The USDA could.

If we give it to the Department of Agriculture, with their tie-in with the land-grant colleges, and use a great deal of this money for fellowships for their brilliant young scientists in the land-grant colleges, it will help to take the place of the scholarship problem now before Congress and develop scientists at the same time. In the case of a fellowship the young person works for what he gets while a scholarship requires no work for the school. Scholarships may run fellowships out of business, you can see that, because they are the easy way. The fellowship is the harder way. But that is the avenue which will develop our scientists and our future teachers, and that is one of my main reasons for wanting the USDA to be the administering agency. Its close tie-in with all of the land-grant colleges makes such an arrangement possible. This program alone could make a wonderful difference in the number of young people we train for science.

I am not willing to take the Manpower Commission's report that we lack the scientists as final. I am not willing to say "die" on that ground. Let us get the scientists, and through making the USDA the agency is the best route to get it.

In the third place, the bills would create another agency, and we are usually against that.

In the fourth place, we would have two agencies with the same purpose. Good organization requires unity of command as a basic principle.

In the fifth place, this separate agency would have to get its research people largely from the land-grant colleges. This would rob the land-grant colleges' experiment stations of their finest research people. I do not think that is wise.

There is no group which has the background the USDA has for this research. It has a vast organization to draw on, and it is doing a wonderful job. You spend some time in these four research laboratories as I have done, and you will be inspired by the power of this organization and its effectiveness.

The program will receive far better cooperation through the USDA if it is the agency because a separate agency will have to depend on the USDA anyway. Why not give it to the USDA at the outset.

26788—58—pt. 3——10

Those are a few reasons why I favor the USDA as the agency to administer this program.

Regardless of the agency selected to administer it, I am for the movement. I believe with all my heart that you are on the trail of a permanent solution to our farm problem, and the quicker we get under way with it, the better our whole Nation will be.

The CHAIRMAN. Thank you, Mr. Congressman.

Senator MUNDT. Mr. Chairman, I would like to ask Congressman Dixon a question or two about the location of the authority. I have always believed we would be better off to create an independent agency for this specific job rather than to make it a part of an overall department such as the Department of Agriculture. If we were to make it a part of a department, I would think perhaps the Department of Commerce would be a better place to put this than the Department of Agriculture, because this is not essentially a job of utilizing the type of techniques in which land-grant colleges specialize. As you improve the efficiency of farming to make 2 blades of grass grow where 1 has grown before, you provide for better production, develop fertilizers, and so forth.

This is a field of merchandising. The Department of Commerce is a merchandising department as against the Department of Agriculture which is a production department. I grant that the laboratories we now have at Peoria and elsewhere are doing a satisfactory job insofar as traditional policy of research is concerned, but we have in mind in this bill something in the nature of a crash program which would accelerate this whole thing and step it up and stimulate it, and charge it with a specific responsibility of spending this money and getting the job done, and getting the job done quickly.

I believe you can do that better by an independent agency operating in the spotlight of public opinion, which succeeds or fails depending upon how well it does that job. The Department of Agriculture can still do a wonderful job and have a comparatively poor function in this particular area, because this would not be, after all, the main cog in the wheel.

I would like to hear your comments on that.

Mr. DIXON. You would like to hear my comments on that?

Senator MUNDT. Yes.

Mr. DIXON. In the first place, it is unwise to attempt to separate utilization research from production research. I know that only 7 percent of our farm commodities now go into industrial use, and we want to step that up terrifically, do we not? Seven percent is almost negligible when compared with the opportunity to use farm products in industry.

Now, let us take an illustration. Suppose you want to make alcohol from corn, or rubber from the alcohol from corn. You are going to have to use the USDA to develop varieties of corn, and they can do it easily, that contain the qualities and properties needed. Here production and utilization research have a problem in common. The two cannot be divorced. This bill, too, is to develop new farm crops for industrial uses. Where is your Department of Commerce going to get scientists to develop new farm crops? Where are they going to get the laboratories which could in any way compare with the land-grant colleges or experiment stations all over the country?

Senator MUNDT. I think the best laboratories to get this job done are going to be the laboratories you are going to bring into this picture under contract, from the field of business, much as we have done in the other Government crash programs, where you let a contract to do a specific job.

I will give you an illustration of why I do not think the Department of Agriculture will ever do this thing rapidly in order to achieve the results. They have a fine land-grant college in my State. They have had a contract under this program which is now underway—because this is not something which is unheard of, this research in utilization, they are working on it now.

They have developed out in South Dakota a formula for using grain straw for developing a packaging board which can be used in making little boxes in packages. It is ready to go, but there is not any facility in the Department of Agriculture, apparently, which can take this know-how and transfer it over into a practical plant.

They are trying to find out, for example, right now, how much demand there is for this particular kind of box, this particular kind of area, so that they can induce private enterprise to build a little plant, start using the formula to produce it.

As I envision the type of commission we should establish, it would have that kind of overall authority, not just get the know-how and file it, but to find a way to utilize it, to do the necessary research, and develop the market; perhaps to help finance, by an initial contract, the early production of these processes to get them going. They have got a lot more know-how now, Congressman Dixon, than we are using.

Mr. DIXON. We have 200 experiments in the test tube now, which give great promise. May I say there that these bills all give us the right to contract with private industry to do just the thing you say. But, any time we divorce production research from utilization research, we are just going to hamstring the whole project.

The CHAIRMAN. I wonder if we could, perhaps, curtail this debate between a Senator and a Congressman.

Mr. DIXON. Certainly.

The CHAIRMAN. That can be done a little later. We have about 12 more witnesses to be heard, from out of town, a good many of them, and I would like to get to them as soon as possible, if you do not mind.

Mr. DIXON. I appreciate this opportunity. Thank you.

The CHAIRMAN. Thank you.

(Mr. Dixon's prepared statement follows:)

Chairman Ellender and committee members, thank you kindly for the opportunity to testify in favor of an expanded utilization research program. My brief statement will comprise the following sections:

1. The monumental achievements of production research.
2. Similar miracles must be accomplished by utilization research.
   (*a*) Outstanding achievements have already been made in utilization research.
   (*b*) Examples of new uses which can be brought about by utilization research.
   (*c*) Examples of new crops which may be produced through utilization research.
3. While utilization research is vitally important, its cost is small.
4. Any bill adopted should retain the United States Department of Agriculture as the administrative agency.

PRODUCTION RESEARCH ACHIEVEMENTS

Astounding achievements have been performed in increasing the production of agricultural commodities through scientific research. The enormous overproduction which has resulted requires that we now dedicate more of our scientific research efforts to increasing the demand for farm products.

Let us cite a few evidences of the success of production research.

In 1830, 1 farmer produced enough for 4 people. In 1930, 1 farmer produced enough for 10 people, while today 1 farmer produces enough for 20 people. There was a time when 80 percent of our people were engaged in farming. Today, farmers number less than 13 percent of the total population.

There was a time when smut in wheat and barley took 90 percent of the crop in certain areas in Utah. Today, as a result of our research at the Utah State University of Agriculture and Applied Sciences in Logan, Utah, smut takes practically nothing.

One seed man in Box Elder County, Utah, told me that they raise more alfalfa seed on one farm in his county than was raised in the entire State before research at Utah State University conquered the lygus bug.

Fifteen years ago, 100 pounds of feed produced, on the average, 24 pounds of broiler chickens, while today the average is 36 pounds of broiler chickens per 100 pounds of feed grain.

The average yield of corn in the Corn Belt States was 35.3 bushels per acre during the 10-year period, 1935 to 1944. It was 42.8 bushels per acre, 1945 to 1956. It was 50.3 bushels per acre in 1956. Last fall, a boy received a prize for producing 300 bushels per acre.

Striking examples of the success of production research are almost limitless. This explosive technological revolution is expanding production about as fast as the soil bank and reduced acreage allotments have cut production.

NEED FOR UTILIZATION RESEARCH

Although utilization research has been given only very small appropriations by the Congress, it has already produced some remarkable results in increasing the demand for farm crops. Let us cite the following examples:

Frozen foods.—In 1930, the USDA established a special laboratory in Seattle and staffed it with vigorous, farseeing scientists who found the answers to the key problems related to frozen foods. With those barriers removed, a billion-dollar-a-year frozen-foods industry has resulted. The money spent on this research was infinitesimal when compared with the wealth produced.

Frozen fruit juices.—Research saved the Florida citrus industry. In 1943, the Winter Haven Laboratory (USDA), in cooperation with the Florida Citrus Commission, developed the basic process for producing concentrated orange juice. Today, no less than 50 percent of all Florida oranges are converted into frozen concentrated juice, showing that research has created a new market for one-half the entire crop.

In his March speech in Florida, Secretary Benson said: "Such bountiful harvests as you have had in recent years would have been a gloomy prospect in times past. But now you dispose of nearly every orange. * * * If you had attempted to build your industry on price supports, you would not be in your present favorable position today."

I have tasted tomato juice, made from tomato powder, that retained practically all of the palatability of the fresh juice. One plant in California is being built to manufacture tomato powder.

Potato granules.—The Department has also been instrumental in increasing the storage life of potato granules, or instant potato, and in developing equipment for its production. The instant potato can be converted into a mash which is virtually indistinguishable from the product made from fresh potatoes. Five companies are now producing this form of dehydrated potato. I should like to quote from G. E. Hilbert, Assistant Administrator for Utilization Research, Agricultural Research Service, USDA: "The domestic demand is so great that the industry has been having difficulty in supplying the market. This industry will continue to expand. We believe this development will do for the potato industry what frozen concentrated orange juice has done for the citrus industry."

Penicillin.—To the Northern Regional Research Laboratory (USDA), Peoria, Ill., must go the credit for making possible commercial production of penicillin through developing strains of molds and perfecting the medium in which molds grow. Alexander Fleming, an Englishman, discovered penicillin in 1929, but it was not used to any considerable extent until Dr. H. W. Florey, of Oxford, Eng-

land, came to the United States in 1941 to ask the help of the USDA to make possible large-scale production. By June of 1943, the total output was 400 million units, enough to treat 400 serious cases, and by 1945 a monthly average of 677 billion units was produced. The wholesale price dropped in these 2 years from $20 to 60 cents per 100,000 units, and the length of time it lasts in storage was increased from 3 to 18 months. The money value of the product in 1945 alone was $100 million. This is more money saved each year than the Government has spent on all 4 of its great utilization laboratories in the last 16 years, let alone any consideration of the hundreds of thousands of lives that have been saved by our research.

Synthetic rubber.—Discovery of the outstanding success of hydrogenated inedible fats for production of synthetic rubber cost the Government $40,000. The estimated value to the public has been $10 million a year based on increased production. There has been a return to agriculture of approximately $3.4 million a year through the market for inedible fats.

Dehydration.—Research on dehydration cost the Government $1,350,000. During the war alone, $500 million worth of the dehydrated vegetables, fruits, and eggs purchased for the Armed Forces and lend-lease must be credited to the application of research findings of USDA.

Cleaning and sorting peas.—The development by the USDA of a new froth flotation process which efficiently cleans vined peas cost about $21,000, including the time and expenses of consulting with processors about application of the process. This is estimated to save about $2 million annually. The savings resulted from elimination of three-fourths of the Labor involved in hand sorting small sieve peas, improving the quality of the peas by more complete removal of the splits and skins, and by saving large quantities of peas that would otherwise have been discarded as a result of their infestation with weeds.

Strawboard.—Strawboard mills began to have difficulty getting enough straw when the combine harvester came into use, scattering the straw over the field rather than blowing it into stacks as did the stationary thresher. A cooperative effort was made for the development and promotion of efficient methods of collecting and baling of straw and preserving it against rotting. The cost to the USDA was $69,000. Yet the farmers and straw mills profited from this research in 1948 alone by $2.2 million.

Cottonseed.—Research by the Southern Regional Utilization Laboratory costing $20,000 advanced the technology of solvent extraction from cottonseed. The estimated value of the increased cottonseed oil produced is from 6 to 9 million dollars annually.

Examples of new uses which can be brought about by utilization research are:

Whole milk powder.—Think of the saving in cost, refrigeration, bottling, and marketing of whole milk that would result from a whole milk powder producing milk just as palatable and nutritious as milk itself. We are almost assured of such a product within the next few years.

Cereal grains.—Each year we use a million tons of additives and modifiers in roadbuilding. This includes rubber and similar products for asphalt; moisture-proof surface coatings for concrete; and products to improve light reflection. Suitable material for all of these uses might be made from grain.

Corn.—If we could increase from 70 to 100 percent the amylose starch produced by corn it could provide a use for up to 100 million bushels of grain. This starch is particularly promising for plastics, transparent films, sizing, coating and adhesive materials for paper and paper products.

Expanded use of animal fats.—Dr. Waldo Ault at the Philadelphia Laboratory said to me: "The use of detergents instead of soap, plastics instead of leather, and vegetable oils instead of lard (all the results of research) has almost put the livestock man out of the byproducts business. I am confident that research will put him back in. We cannot afford not to do research."

In 1947 the soap industry alone used 1.5 billion pounds, or 71 percent, of our animal fats. Today it uses only 812,720,000 or 27 percent of total inedible fats. This is all due to the development of competitive detergents by industry. Synthetic detergents put animal fats on the skids. Most detergents have a petroleum base of 20 to 30 percent. Dr. Ault told me there are some disadvantages to petroleum-based detergents. Soap is better in soft waters but poor in hard waters. Soap can be produced in bar form. Petroleum-based detergents cannot. Detergents are less effective in keeping soil suspended in the water.

The USDA has research underway designed to make an animal-fat-based detergent that will compete successfully with petroleum-based detergents. The USDA has also developed oils from animal fats, which oils will compete successfully with petroleum oils as additives. Their product is fully as good as the com-

mercial oils and better for some purposes. To illustrate: As the parts of machinery get smaller and smaller and the pressure greater and greater, oil plays an important role. Commercial oils break down under 1,700 pounds pressure, while the oils being developed from animal fats in the Philadelphia laboratories stand up under 2,000 pounds pressure. This development has significant possibilities and could have a positive influence on livestock prices and markets. Its potential could reach 300 million pounds or 10 percent of the production of animal fats.

In addition to uses in detergents and oils, fats have an increasing outlet in plastics. Plastics are tending to put leather out of business and research on animal and plant fat-based plastics would replace the losses to farmers from low-priced hides. A number of the larger plastic manufacturers are using more and more fats in the manufacture of plastics. You will be interested to note that the new soft pliable plastic lawn hose is a rather recent result of research in the use of fats to give the softness and pliability to plastics. The same is true of plastic seat covers and Armstrong's vinol floor tile.

The discovery and use of antioxidents to prevent melted fats from becoming rancid has opened up the fertile field of fats in mixed livestock and poultry feeds.

It is entirely possible that our farmers can increase their income, if not through the production of new commercial crops then through increased uses of existing crops. Many new crops are almost ready. More than a dozen others show considerable promise and hundreds of others are in the early testing stages. Plants which have been grown successfully in other parts of the world are being tested to see if they can be adapted for commercial production in parts of the United States.

Soybeans, for example, and Korean lespedeza were developed this way. Of more than 250,000 plants grown in the world only 150 are grown commercially in the United States and only 80 have markets exceeding a million dollars a year. The following are illustrations:

Bamboo.—As many as 50 million acres, twice the current acreage of soybeans, might be grown for industrial uses. Bamboo is roughly four times as productive as well-managed southern pine as a source of cellulose for the manufacture of high quality paper and much more profitable. It is also a valuable structural material for furniture and special products. All of our bamboo, however, is imported at present. Acres of bamboo could replace acres now in cotton, peanuts, and dryland rice in the Southeast. It is believed that through research in production methods, utilization, and marketing the remaining obstacles can soon be overcome.

Castor beans.—Likely the most profitable new crop in the offing is castor beans. Acreage might ultimately expand from 75,000 acres to more than 1 million acres. At present 90 percent of the United States needs are imported. Oil from castor beans has unique qualities for use in paints, varnishes, fungicides, and cosmetics. Until disease problems are beaten, production is likely to be confined to the Southwest. The high cost of harvesting machinery is the main obstacle to expanded production at present. However, the USDA, as well as industry engineers, are working to trim these costs now.

Safflower.—Safflower is a dry-climate thistle producing oil used in varnishes, enamels, and high quality paints. The meal is a good source of protein for livestock. It can be a replacement for wheat in high plains area and in the winter in some cotton sections of California and Arizona. Hundreds of farmers in northern Utah have accepted contracts to produce safflower seed in recent years. Continued research, however, is needed in breeding high yielding and early maturing varieties and on new uses for the oil.

Sesame.—Some researchers believe that sesame may become an industrial crop for the South nearly as important as soybeans are to the North, although this may be sometime off. Sesame was first grown in 1950, and approximately 25,000 acres are now grown. Under favorable conditions sesame can produce more oil per acre than any other edible seed crop.

Canaigre.—The winter-warm valleys of southern Utah and the Southwestern States may sometime produce canaigre roots as a commercial source of tannin. The leather industry now imports 75 percent of its tannin.

Other potential new crops include jojoba, for the production of oil and wax; candelilla, another promising source of vegetable wax with 34 uses already known; and kenaf, to produce a fiber useful in the manufacture of burlap, twine, carpet yarn, and paper pulp.

SMALL COST

The cost is small. We might already be producing many of these new crops, and we might already have expanded uses for our farm crops had we been dedicating greater financial resources to utilization research. For every hundred dollars of farm income we spend 50 cents for research (a small fraction of the $3 per hundred spent by industry on its research.) Yet only 4½ cents of this 50 cents has gone to marketing and utilization research. The cost has been negligible, yet the results are already admirable.

When you think of the billions of dollars which have been lost in unsuccessful price-support programs, it highlights the need to expand the small appropriation given for utilization research which will help cure the farm problem rather than be like an aspirin and merely deaden the pain.

The USDA has increased its request for utilization research funds each year, and frequently has had a rugged battle securing approval for these modest increases. The latest figures available indicate that 19.3 percent of USDA's research appropriations go for utilization research, and in 1951 two percent of industry's gross sales go for research.

ADMINISTRATION

S. 724, S. 2306, and S. 3697, which your committee is considering, are setting up a separate agency for the administration of utilization research. Although I can see that a separate agency might have certain publicity values and draw more attention to utilization research, I strongly urge that your committee retain the USDA as the administrating agency. Let me urge the following reasons:

1. The establishment of an individual commission would add another agency which would be more costly than administration under our existing agency, the USDA. The trend should be in the direction of eliminating, not expanding, Federal agencies.

2. There would be unity of command under USDA. Any agency outside the Department and under the executive branch would of necessity use the organization of the USDA to accomplish its assignment. This double-headed organization would lack unity of command and, as a result, cause continuous confusion, delay, and friction.

3. Utilization researchers must have the help of production researchers. We need to develop strains of wheat containing a greater percentage of properties from which rubber and alcohol can be manufactured; yucca plants containing more cortisone; corn with 80 percent instead of 50 percent corn wax or amylose. Many other examples can be cited to show that the plant breeder and the utilization researcher must work as a team.

4. There is no group with the needed background except the USDA.

5. USDA has a vast organization upon which it can draw.

6. Its tieup with the extension service and experiment stations would make research better adapted to the needs of the various areas.

7. USDA would receive better cooperation and more financial support from the States and include experiment stations as an integral part of the program.

8. Graduate students in land-grant colleges could be added to the staff of researchers, help relieve the shortage of research people and develop into potential staff members.

9. The land-grant college association has gone on record favoring the bills which leave the administration in the USDA. They have established relationships with the USDA and feel these could be expanded for the benefit of the Nation as a whole and for the benefit of the research programs of the colleges.

10. Dispersion of industry is becoming more necessary every day. Research assigned to the land-grant college would encourage such dispersion.

CONCLUSION

It is my conviction that both economic logic and our historic experience prove that artificial price-maintenance programs for agriculture are ineffective and wasteful. Our job is to quit attempting the impossible task of repealing the law of supply and demand and instead take full advantage of the law of supply and demand. One vital method is by greatly expanding utilization research to increase the demand for the present and potential products of our farmers.

The CHAIRMAN. Dr. Lambert.

STATEMENT OF W. V. LAMBERT, DEAN, COLLEGE OF AGRICULTURE, UNIVERSITY OF NEBRASKA, LINCOLN, NEBR.

The CHAIRMAN. Dr. Lambert, as I have just stated, I am glad to again see you. I had occasion to meet you in Moscow when you were on that trip with the farmers from over the States, and last year when I was in Omsk, I think it was, I had occasion to meet a Russian who had been on this trip, and he suggested that I write you, and I did. I hope you got my letter——

Mr. LAMBERT. I did.

The CHAIRMAN. Or my postcard, and that you wrote back to him.

Mr. LAMBERT. I did, sir. And, like most of the Russians to whom I have written since I have been there, I never have gotten any reply. It seems to be characteristic.

The CHAIRMAN. This fellow wrote a book, as I understand, on the travels you made, and others, and I think I have a copy of it in Russian; if you want to make use of it, I will be glad to let you have it.

You may proceed, Dr. Lambert.

Doctor, if you desire, you may place your whole statement in the record, and highlight it, if you want to, or read it.

Mr. LAMBERT. Mr. Chairman and gentlemen of the committee——

The CHAIRMAN. As I just stated, I do not wish to cut anybody off, but many people have come from afar to testify today, and I want to be sure to give them all an opportunity of appearing before this committee.

Mr. LAMBERT. Mr. Chairman and gentlemen of the committee; I have prepared this statement, which I want to highlight at this time, in the interest of saving time for the other witnesses and the time of the members of the committee.

(The statment referred to follows:)

Mr. Chairman and gentlemen of the committee, my name is W. V. Lambert. I am dean of the college of agriculture at the University of Nebraska. I appreciate the opportunity of appearing before your committee to testify in favor of S. 2306, S. 3697 and related ones, which have as their purpose the increased industrial use of agricultural products. These bills, in my opinion, are among the most important pieces of legislation that are before the Senate and I would urge early approval of legislation aimed at finding new uses for agricultural products.

The excellent report to the Congress by the Presidential Commission on the Increased Industrial use of Agricultural Products, under the chairmanship of a distinguished fellow Nebraskan, Mr. J. Leroy Welsh of Omaha, has set forth very clearly and completely the needs for and the importance of such legislation as you are considering here today. This report stresses the urgency of getting at this job. With this I am in complete agreement. Such action is long overdue.

At the outset, I want to emphasize that I do not believe such legislation will be a panacea for the many problems now confronting agriculture. Neither will it bring about rapid improvement in the status of agricultural surpluses. In the long pull, however, it will result in the discovery of many new industrial uses for agricultural crops. It will also result in the discovery and commercial development of new crops of great potential importance to the national welfare. In view of the present situation of agricultural surpluses, the Congress is certainly justified in taking any steps that will help to alleviate this situation and to decrease the mounting costs of handling these surpluses. Currently about 3 to 4 percent of the annual production of all farm commodities is used for industrial purposes.

The estimated use in 1954 of various crops for industrial purposes and the value of such crops are shown in table 1 [1]

Crop	Estimated quantity used (million pounds)	Estimated value (million dollars)
Cereal grain products	1,662	139
Oils and fats	2,524	302
Meat and poultry products	4,603	352
Daily products	30	4
Cotton products	8,092	2,407
Wool and mohair products	251	139
Tobacco	203	703
Sugarcane and beet products	4,850	38
Agricultural residues products	3,270	54
Miscellaneous	436	48
Total	25,921	4,186

[1] Figures through courtesy of Northern Utilization Research Division, USDA.

The estimated percentage of each crop used in 1954 for industrial purposes is shown in table 2 [1]

Crop:	Percent	Crop—Continued	Percent
Potatoes	2.5	Wheat	0.5
Fruits	5.8	Sugarcane and beets	4.9
Vegetables	.3	Cattle and calves	8.7
Corn	3.3	Cotton	58.3
Soybeans	3.3	Tobacco	67.8

[1] Figures through courtesy of Northern Utilization Research Division, USDA.

If this rate of use could be tripled or quadrupled, it would do much to prevent the pyramiding of future surpluses for most crops. Wheat still would remain a major problem unless some significant new uses are discovered. Because research of this type is a longtime process, it is improbable that a research program, such as proposed in the legislation under consideration, would help much to dispose of the present huge surpluses. It should help eventually by preventing further accumulations of these surpluses.

Such legislation is badly needed for other reasons. At the present time agriculture is being researched by industry out of the natural markets for its products. Industry is investing at least $3 billion a year, or about 3 percent of its gross sales, in research. This is bringing a veritable flood of new products on the market that are displacing many agricultural products. Most of them come from petrochemicals. This research by industry is continuous and intensive. In contrast to this, agriculture is spending only about $375 million for research, about 1 percent of its gross sales. Of this total, a relatively small percentage goes for research aimed at finding new industrial uses. If agriculture is to be kept in a favorable position with other industries, it is exceedingly important that research on its products be greatly increased. Agriculture and the businesses related to or dependent upon it represent the largest single industrial group in the Nation. Dr. John Davis of Harvard University estimates that from 35 to 50 percent of the Nation's resources are tied up in agriculture and related businesses. Maintaining these many activities in a prosperous condition is exceedingly important to the Nation's economic health.

Looking at this problem from an even longer viewpoint, a vigorous research program is needed to get the facts that will be required to supply our industries with raw materials when supplies of nonrenewable natural resources, such as petroleum, are exhausted. Many of these products will eventually have to be replaced by the renewable resources from agriculture. A program of industrial research such as is contemplated in the legislation now under consideration will result in the discovery of the basic facts needed for this purpose. These discoveries will be a most important byproduct of research aimed at finding new industrial uses for agricultural products.

COMMENTS ON VARIOUS ASPECTS OF THE PROPOSED LEGISLATION

These bills, in my judgment, contain many provisions that will help to speed up and intensify research on the industrial utilization of agricultural products. The proposals relating to contracting are good. The authorization for contracting should be such as to encourage the widest possible participation by governmental agencies, universities, agricultural experiment stations, industrial research agencies, and private research organizations. In order to provide for continuity in research and development, the authorizations should provide for contracts up to 5 years. This feature would encourage and help a research agency to recruit the best manpower available. Without such a provision it will be difficult to recruit the best talent.

There should be broad authorization to undertake basic research of all kinds. While such research will not result in finding immediate uses for agricultural products, it will in the long run give the facts needed to make the overall research activities most effective. No research program can hope to be effective for long unless it is buttressed by a strong program of basic research. This is the key factor behind the large and productive research programs in industry. The rapid progress in aeronautics, for example, is due largely to discoveries coming from basic research.

The proposal to use funds collected from customs receipts for the support of these research activities is very good. This will insure continuity in support from year to year which is essential if competent staffs are to be built up and retained. In my judgment, authorization should provide for carrying over of funds appropriated in 1 year to subsequent years. This provision will be very helpful to those who are responsible for the development and implementation of research contracts. It will be especially important in the early stages of the program when the many details essential to such an undertaking have to be developed.

The feature of the proposed legislation that provides for pilot scale testing and commercialization of promising developments is essential if discoveries from the research laboratories are to be placed into commercial production. One of the bottlenecks in getting such proposals into use is the reluctance of industrial management to spend the funds necessary to do this. The costs of such pilot scale operations are large and the mortality is high. These steps are a part of the applied research finally needed in getting new discoveries into commercial use. Such authorization should reduce the period from the drawing board to final industrial utilization.

Careful consideration should be given to the patent features incorporated into this legislation. Many of the patent features incorporated in Government research contracts delay the use of promising discoveries by industry. The feature of the legislation which will permit contracting for pilot scale operation and commercialization should tend to overcome this difficulty. Nevertheless, this problem should be considered carefully in the final draft of the legislation. The purpose of the legislation is to get increased industrial uses for agricultural surpluses. The proposed legislation should not include restrictive patent clauses which would hinder accomplishment of this objective.

The legislation should include provisions for discovering new crops of potential importance to American agriculture, for developing agronomic practices necessary to successful field production, for genetic improvement, and for promoting the commercial production of such crops. Undoubtedly there are many species of plants that would be beneficial in agriculture and useful to the American economy if the properties of these plants were known. Finding, developing, and improving these species to the point where they are useful for industrial or agricultural purposes is a slow process. The national welfare requires that such efforts be speeded up. The proposed legislation would provide for this.

A program of the magnitude contemplated by this legislation will require many additional scientists. Hence the features of the bills aimed at increasing the supply of scientists are essential. Fellowship authorization under the act should be such as to encourage both predoctoral and postdoctoral training. The stipends should be large enough to encourage students of superior ability to prepare themselves for careers in science. Currently only a relatively few students are training for scientific careers because other careers have been more attractive financially. The training required of a scientist is long, difficult, and exacting and most young people hesitate to make the sacrifice required for this.

It is most important that this legislation make it possible to pay salaries that are competitive with those paid in industry if this program is to be most success-

ful. No program will be better than the men who are responsible for it. Agriculture cannot afford to be put in a position of accepting second-rate scientists. The nationwide publicity for more engineers and scientists in the last several years has resulted in pulling many of our ablest high-school graduates into careers other than those related to agriculture. This overlooks the fact that a student can get the finest type of scientific training in a college of agriculture while at the same time he is getting the kind of background training that fits him for some phase of scientific or industrial work that serves agriculture. Persons with such training should receive salaries comparable to those with the same degree of training in other industries and professions. This legislation also should be so framed as to encourage exchange of scientists between universities and governmental and industrial research laboratories. It also should provide for exchanges with scientists in foreign countries.

A recent action of the United States Civil Service Commission increased the pay rates for engineers and physical scientists but not for biological scientists. This action is detrimental to the USDA and other agricultural research agencies. In my opinion, any action of this sort by the Civil Service Commission should apply equally to all scientists. The inevitable result, otherwise, will be a shortage of men in many very important areas of the biological sciences.

The proposal in the legislation to make loans or grants for the development of needed facilities for industrial research on the utilization of agricultural surpluses is good. I also believe that the provision for amortization of the costs of such facilities over a 5-year period for tax purposes is desirable. Perhaps it will be necessary to harmonize the latter feature with loan or grant provisions.

The idea of contracting with foreign institutions using foreign currencies obtained under Public Law 480 is a desirable feature of the legislation. Many foreign laboratories have able scientific staffs. This feature of the legislation should help in getting many of these scientists to work on problems concerned with utilization of agricultural surpluses. This would be most desirable.

ADMINISTRATION OF THE PROGRAM

Two of the bills, S. 230 and S. 3697, propose the creation of an Agricultura and Industrial Board to administer this program. One other, S. 724, proposes that the administration be assigned to an Agricultural Products Administration to be created in the executive branch of the Government and assigned to the United States Department of Agriculture.

It is most important that the Agency charged with administering this important program be given broad authority to contract with any agency of the Government, universities, industry, or foreign research institutions. Of the proposals listed for administration, my preference would be for the creation of a separate Board for this purpose, although I am sure that other patterns of administration could be successful. My reasons for suggesting administration by a separate Board are:

1. This would encourage the widest possible use of all research facilities. All governmental agencies would be in the same competitive position insofar as contracts are concerned as would universities and industrial laboratories.

2. It would tend to obviate jurisdictional disputes between governmental agencies. If the administration of the program were assigned to one executive branch of the Government, this might discourage full cooperation by research agencies in other executive branches.

3. An independent Board might be freer and more objective in acting on controversial proposals than would the Secretary of Agriculture, who also has the administration of present agricultural programs.

4. Assignment of a program of this magnitude to the Department of Agriculture, or to any other executive department, might result in concentration on the new program to the detriment of the excellent existing research activities already underway in that department. This would be most unfortunate.

5. Many of the activities in such a broad program could properly be considered as outside the normal field of agricultural research. Many of them would involve developing commercial uses and hence would normally be considered a proper function of the Department of Commerce. An independent Board might be more objective in assigning research activities to the Department best equipped to handle them.

If an independent Board is created to administer the program, its functions, in my judgment, should be strictly that of review, administration, and contracting

of research. It should not be authorized to conduct research nor should it own or manage research facilities. Where additional research facilities are needed, these should be built with funds provided under research contracts or be built by the Government for use of its agencies.

The Board or other agency administering the program should have broad authority to set up advisory boards or panels, on a per diem basis, to assist in the review of research activities in this field and to recommend on contracts and other proposals coming to the Board for support.

Much research is currently underway in the general field of industrial utilization. The administrative agency responsible for this program should work closely with the agencies now doing research in order to make the most effective use of money, manpower, and resources. However, the legislation should not be too restrictive in this regard. Some duplication of effort is essential for rapid progress in any field. Generally, what seems on superficial examination to be duplication will prove, on closer examination, not to be duplication. Research involves exploration into the unknown and various approaches toward a given objective may be necessary to get the answer. We should not hinder progress by putting on restrictions which will handicap the scientist in using his fullest imagination and ingenuity in reaching a given objective.

The goal of the proposed legislation you are considering is of such vital importance to agriculture and the economic well-being of the Nation that I want to urge its passage with the least possible delay. The dividends in the long run will far exceed the cost. Its goal is to develop uses for the products from American farms that will permit of full and free production. This, in my opinion, is much more in line with American tradition than the agricultural program that has been followed for the past 30 years and which, I think we would all admit has not solved our problems.

Mr. LAMBERT. I want to say that I appreciate the opportunity of appearing before you in support of Senate bills 2603, 3687, and related bills the numbers of which I do not have, which have as their purpose the increased industrial use of agricultural products.

This, I think, is probably some of the most important legislation you men have before you. I think it is long overdue, and I would urge its early passage.

The excellent report of the Presidential Commission on the Increased Industrial Use of Agricultural Products under the chairmanship of a distinguished fellow Nebraskan, J. LeRoy Welsh, has set forth very clearly and distinctly the importance of this legislation and what it might do for the American agriculture.

While research on the industrial use of agricultural products will not, in my judgment, bring an immediate solution to our agricultural surplus problems, it will in the long pull be of tremendous help in solving these problems.

If the current rate of use of such products—and the figures I have were obtained through the courtesy of the Northern Regional Laboratory of the United States Department of Agriculture in their 1954 figures—which was 3 to 4 percent of the production, if that production or that use could be tripled or quadrupled, this would do much to prevent the pyramiding of future surpluses.

Agriculture needs an extensive research program of this type if it is to retain its markets. Currently, industry is spending about $3 billion yearly in research, while agriculture is spending about $375 million.

As a result, agriculture is being researched out of its markets.

If agriculture is to maintain its position in the American economy, research activity aimed at finding new uses for its products must be greatly increased. The proposed legislation contains many sound provisions, which I wish to endorse.

These include (1) a broad provision for contracting by governmental, university, and industrial laboratories which should be, in my judgment, for periods up to 5 years, to provide for continuity in research and development. I think that is essential.

It should provide for basic research, because basic research is going to get the facts upon which the more applied research and your developmental research must be built.

The provision for pilot-scale testing and commercialization is a very sound one, and a necessary one, in order to get these laboratory developments into use in industry.

The provision for discovering new crops or the developing of suitable agronomic practices for their growth and for their genetic improvement is also, in my judgment, very sound.

The legislation should not include restrictive patent clauses which will hinder accomplishment of its objectives. I think, probably, restrictive patent clauses in the past have tended to hinder the getting of some of these discoveries into practice.

The provision to train many additional scientists through a program of scholarships is essential. We will need those people if you get a research program of this magnitude.

This should provide for both predoctoral and postdoctoral fellowships and for exchange of men between the industries, Government, and the universities. Wide leeway to pay salary scales which will make it possible for universities and governmental agencies to be competitive with industry is needed, because industry can outpay us at the present time. We are always running into that problem of keeping our good people.

The proposal to make loans or grants for needed research or development facilities and to provide for contracting with foreign research agencies, using foreign currency obtained under Public Law 480, are both very desirable. They have many good research people in these foreign laboratories, and if we can put them to work on our problems, I think we ought to do it.

Such legislation could be administered successfully under any one of several organizations, in my judgment. Of the various proposals listed, I would prefer the creation of a separate board for this purpose. I believe this would result in greater emphasis on the program, and would be more apt to encourage wide participation in the program by all research agencies. It would insure all types of agencies equal opportunity for participation in grants and contracts.

It would tend to obviate jurisdictional disputes between governmental agencies, and would be less likely to interfere with sound, going research activities which are badly needed, such as the excellent research programs which the USDA and the State agricultural experiment stations are now conducting.

The Department of Agriculture could give you good reasons why it should administer this program. The important thing, in my judgment, is to insure that men of ability, enthusiasm, and imagination are in charge of it.

If this program is assigned to the USDA, its contracting authority should be very much broadened. Any legislation of this type should provide for the fullest use of existing facilities and manpower. It should not interfere with or minimize the importance of the excellent

research programs now underway in the agricultural experiment stations in the United States Department of Agriculture. These are essential to the continued welfare of the American farmer.

Your committee is to be commended on its efforts to get such legislation enacted. I urge its early approval.

Thank you very much.

The CHAIRMAN. Thank you, Dr. Lambert.

Senator MUNDT. I am not going to renew the debate, Mr. Chairman, but I do wish to commend Dr. Lambert in listing what I deem to be very cogent and persuasive reasons why this can best secure results through an independent agency, not the least of which is that it is highly important that we do make the pay scales attractive enough to get the kind of people required to do the job.

Mr. LAMBERT. That is a very important point.

Senator MUNDT. It is pretty difficult to administer in the Department of Agriculture if you have one blue-ribbon shop being paid better than other people in the Department who have devoted a lifetime of service to the Department.

Senator CURTIS. Mr. Chairman, Mr. Levitt is under considerable pressure to get away.

Senator AIKEN. Dr. Lambert, is it wallboard or wall wood you administered?

Mr. LAMBERT. I did not have it directly. I did administer the research program in the Department of Agriculture for several years and one of the laboratories, the Northern Laboratory of the American regional division did do a good deal of work on some of the wallboard.

The CHAIRMAN. Thank you, Dr. Lambert. Mr. Levitt, have you a prepared statement?

Mr. LEVITT. Yes; I do.

The CHAIRMAN. You may proceed, sir. I notice we have quite a few other witnesses present, and I want to give the opportunity to all who have come to testify.

STATEMENT OF D. M. LEVITT, PRESIDENT, DCA FOOD INDUSTRIES INC., NEW YORK, N. Y.

Mr. LEVITT. Thank you, Mr. Chairman. I want to say I am very happy to be here to testify in support of bill S. 2306. I would appreciate my written testimony being made part of the record, and I will speak briefly on some of the things that I have in the written testimony and some of the things that I——

The CHAIRMAN. You may proceed to highlight it. The whole statement will be put in the record.

(The statement referred to follows:)

I am happy to appear before you gentlemen in support of bill S. 2306. As a method of dealing with our agricultural surplus problems, I believe this bill is extremely effective. Its research provisions would yield great dividends to the citizens of the United States.

I want to make it clear at the outset that I am not necessarily testifying in support of the administrative techniques suggested by the bill. I have not had an opportunity to check the various possibilities in this area. I am not familiar with the administrative needs of such a program. I am referring in my testimony only to the kind of research program suggested.

I am the president of DCA Food Industries, a company which operates in many areas of the food business. Established in 1920, it is now engaged in processing agricultural products to supply the baking, dairy, meat, fish, and

poultry industries, hotels, restaurants, and institutions. In addition, the company processes agricultural products into consumer products which are sold directly to the consumer. It operates restaurants, also, from coast to coast, serving over 15 million people a year. In addition, the company operates flour mills and, also, has foreign subsidiaries operating in Canada, England, and Australia.

I have given you this outline of the activities of our company so that you can know I speak with some intimate knowledge of the food business.

The food business of the United States is the largest business in our country. In 1957, the total goods and services produced by the food business was over $75 billion. At the same time that it is the largest business in our country, it is also one of the most competitive. One need only check the annual statements of most companies active in the food business to know that the average profit percentage after taxes in many areas, is as low as 1 percent and in very few above 3 percent after taxes. This means that the companies using agricultural products are very limited in the research that they can do.

The budgets of food laboratories are limited primarily to the application of already known technology. Most food companies are not in position to take the large risks involved in pushing forward the frontiers of knowledge, in the processing of agricultural products—and yet, it is the food companies who are the largest users of the agricultural products and must develop the new uses.

The President's Bipartisan Commission on the Increased Industrial Use of Agricultural Products worked with many task forces. These task forces outlined as a result of their studies, very many research projects which could lead to very large increased uses. The task force reports show dramatically that the only effective method of developing these research projects is through the teamwork of Government, agriculture, industry, and scientists. I believe that bill S. 2306, provides effectively for this kind of teamwork.

I would like to tell you of an experience which DCA Food Industries had during World War II, that demonstrates the possibilities in this kind of teamwork. As you will recall, sugar was rationed. It was a critically important item in the production of DCA products. We determined that it would be possible to produce a dextrose sugar which would be a very satisfactory substitute for sucrose sugar from an agricultural commodity, which even during the war period was in plentiful supply. The idea involved the production of dextrose from wheat flour. Many technical problems were involved. The Peoria Regional Research Laboratory of the Department of Agriculture, was working on some projects related to the technical problems in the separation of starches and proteins in wheat flour. The DCA scientists and the scientists from the Peoria Regional Research Laboratory worked together and within a 6 months' period of highly concentrated efforts, it was possible to produce the required products.

This was in 1943 and by 1946, the company was producing products from flour at the rate of 150 million pounds of flour per year. Many of the byproducts produced were critically important in the war effort, such as the protein which was used for production of monosodium glutamate, a required ingredient in the flavoring of some of the military food products. Also, the wheat sugar molasses was used in the vital production of alcohol and synthetic rubber. This was an example of excellent teamwork between the Government and industry—and the use of a plentiful product for producing new and necessary industrial products.

At the end of World War II, this wheat chemurgy operation was discontinued by DCA Food Industries. However, the company continued to maintain an interest in the ideas. Many avenues of research which had been opened up in the work done during the war, were recorded as projects to which the company wanted to return as soon as possible. However, as mentioned above, the economic necessities of the food business made it impossible for the company to allocate money in these areas for about 9 years. Two years ago, the company determined to return to wheat chemurgic pure research. Since making this decision, we have been spending on this research a relatively large amount of money for a company our size.

However, we are severely limited in what we can do. We are working in a most confined area. We know that the possibilities for upgrading many of the byproducts involved in wheat chemurgy are extremely great. We think that the results of the effort could mean the use of millions and millions of bushels of additional wheat per year.

This kind of searching is never guaranteed to bring results. But, experience in pure research leads inevitably to the conclusion that the results often are dramatic and unexpected. The pilot-scale tests, the research grants, the use of

agricultural products as referred to in bill S. 2306 could multiply the efforts of DCA many, many times.

We live in one of the few countries of the world where food is available in abundance. We in our country and all of the democracies of the world are engaged in a struggle which challenges our right to existence. I do not believe that in the challenge which faces us, we can afford to permit the abundance of our agricultural production to go to waste.

One of the important measures of our success in meeting the challenge will be our effective use of this abundance. Our experience in the United States has demonstrated that no methods of controlling production have to this date, solved the problem.

A relatively small amount of money is involved in producing research work, which in my opinion has the best possibilities of solving this problem. The teamwork necessary between Government and industry is very well provided for by the provisions of bill S. 2306. The results may prove to be as dramatic as the results of the Manhattan project and perhaps even more effective in contributing to a peaceful world.

Mr. LEVITT. I agree with the statement by Senator Symington this morning that this is one of the most important problems of our Nation. I think that this bill and the other bills along with it get to the very heart of the problem, which I believe is a responsibility of you men who are the leaders of our Government and the leaders of our country.

I know from my own experience in management in industry that the responsibility of leadership is to release the energies of those people who are participating in the particular group. In this instance, I feel that these bills permit the release of energy of many of our people to tackle this most important problem in the Nation. The present energies of our people are bottled up in my opinion by conditions which are basic to agriculture and basic to the food industry.

The food industry is the largest in the country, over $75 billion, but the percentage of profit made by food companies is very much smaller than most of the industries of the United States. It is the most highly competitive industry in the country. This means that food companies who can be very much responsible for solving this problem do not have the money and cannot spend the money necessary to solve them.

For example, to demonstrate that this cannot be done, let's take the experience with monosodium glutamate, which is a very important flavoring agent, and is currently being made from Stephens waste in the beet industry and from wheat protein, which is refined from wheat. It has been released recently that a chemical company has developed a synthetic method of making monosodium glutamate.

The chemical industry is an industry which makes a much higher percentage of profit than most of the industries in the food business. This particular chemical company I understand is going to spend $4½ million to set up a plant to make synthetically monosodium glutamate now made from agricultural products. Here is a perfect example of another industry creating a synthetic process to eliminate an agricultural process now being used. This can be repeated all over the food business. But I have said that the energies of the people in the food business and in agriculture are bottled up now because of the limitations of the conditions in which we find ourselves.

This bill provides not only for the research which is being done by the regional research laboratories now, but provides the important bridge which allows the contractor of research to industries the testing by industries, subsidized by the Government so that they can take the risk necessary in developing some of the very important new indus-

trial uses. I would like to say that my own company has done work in the field of wheat chemistry.

Someone said earlier, why is it that the food business and other people close to agriculture have not done these things which we have talked about today that sound so tremendous and I have tried to explain why they have not. But some people, such as ourselves, have made some efforts. We have spent in the last couple of years hundreds of thousands of dollars in pure research in wheat chemurgy because we believe that the revolution of the future in the food business is going to come in these areas.

But we have limited resources compared to the job that we are tackling. These bills would release our energies tremendously by providing us with a little support, a little subsidy which would put us in a position to take a big gamble, and these things are mostly very big gambles. Businessmen are fundamentally big gamblers, but they are always calculated gamblers. They want to have a chance to win and they want to have some protection. I believe that this bill provides for some of that protection.

The CHAIRMAN. Thank you, sir. Is Dr. Laxer present?

Mr. LAXER. Yes, sir.

The CHAIRMAN. Will you step forward.

STATEMENT OF GERALD LAXER, DIRECTOR OF SCIENCE AND TECHNOLOGY, WOOL BUREAU, INC., NEW YORK, N. Y.

Mr. LAXER. My name is Gerald Laxer, director of science and technology of the Wool Bureau, Inc., of New York. I also had the pleasure of serving on the Wool and Mohair Task Group of the President's Commission, and also on the technical subcommittee of the Department of Agriculture's Wool Marketing and Research Advisory Committee.

I have a written statement which I would like to turn in for the record, and which I will just briefly highlight now, Senator, if I may.

The CHAIRMAN. Permission is granted for that purpose.

(The statement referred to follows:)

It is my purpose today to discuss with you the reasons why I feel that a comprehensive and farsighted research and development program to increase the industrial use of agricultural products is vital for a healthy economic future for the agricultural community in general and, specifically, for woolgrowers who are a small but essential part of that community. Peculiarly enough, wool, as an agricultural commodity, is not produced in surplus in this country but, on the contrary, is produced in insufficient amounts. This, in terms of the relationship of wool to our national security and to the economic health of woolgrowers, is somewhat like a subnormal temperature. We all know that when we are running a fever something is organically wrong with us and needs correction and the same can be said when our body temperature is significantly below the normal temperature. Thus, while wool does not present a problem with respect to surplus like many other agricultural products, its production in deficient amounts in this country in a way can result in serious repercussions. My main point here today is to point out to you that a long-range research and development program for wool is, in a relative sense, as important to the long-range economic health of the section of our agricultural community and national security as similar programs for agricultural products which are produced in surplus.

Let me explore briefly with you the recent past history of wool as an apparel fiber in this country.

1. PAST AND PRESENT RAW WOOL PRODUCTION IN UNITED STATES

In the past two decades wool has been shorn from a declining sheep population in the United States; the numbers being approximately 50 million head in the 1930–39 period and only 27 million head in 1956. Domestic sheep yield only apparel type wool[1] (fiber diameter range, 1.42–0.74 x 10^{-3} inch) most of which is shorn from the live animals and some of which is pulled from the pelts of slaughtered animals after treatment with depilatory agents. The total amounts of shorn and pulled apparel wool and of other textile fibers produced in the United States in recent years are shown in table I.

2. PAST AND PRESENT UNITED STATES RAW WOOL CONSUMPTION (UTILIZATION)

Since our wool requirements are greater than our production, it is of interest to examine the relationship between United States apparel wool production, apparel wool imports[2] and United States mill consumption of apparel wool in recent times. The amounts (in million of pounds, clean basis) of these various wools handled in the United States from 1949 through 1955 are shown in figure 1. Also shown in figure 1 for these years are the ratios of apparel wool production and imports to total apparel wool consumption expressed as percent of consumption. It can be seen that apparel wool consumption dropped off to about 300 million pounds per year during 1955 and 1956, to a two-decade low of 243 million pounds in 1957 from an abnormal high of 449 million pounds during 1950. This latter situation was precipitated by the Korean crisis. Parenthetically, it might be mentioned here that the price of finer, raw apparel wool soared to an alltime high of over $3 per pound during the Korean crisis. The 1950–51 consumption (military and civilian) and price figures are sufficient evidence to show "that wool is an essential and strategic commodity which is not produced in quantities and grades (fiber diameters) in the United States to meet the domestic needs. * * * "[3] It is noteworthy that domestic apparel wool production showed a slow but steady increase from 120 million pounds in 1952 to 134 million pounds in 1955. (Production dropped to 128 million pounds in 1957 due to widespread drought.)

The decline in total apparel wool consumption since the 1951–53 period is reflected by the fact that in recent times a somewhat steady domestic production satisfied almost 50 percent of the mill requirements (1955–57) (fig. 1), while 3 to 4 years earlier it satisfied only 30–35 percent of the mill needs.

3. THE DECLINE IN WOOL PRODUCTION

The very significant decline in the past 20 years in United States apparel wool production, i. e., from a yearly average of 185 million pounds during the 1930–1939 period to 128 million pounds in 1957, is attributable mainly to three reasons:

(1) the disproportionate rise in production costs, including the shortage of labor,

(2) the relative economic attractiveness of other crops,

(3) the competition of other fibers.

Increasing production costs have been a major factor in bringing about the decline of domestic apparel wool production. The higher wages of other industries have forced the herder's salary to rise so that fewer herders, and thus less sheep, could be maintained. Added to this are increased feed, medicinal, and rail and trucking costs which have depleted sheep numbers for obvious reasons. Finally, the depletion of sheep numbers was helped by the attractive prices received for grains, dairy products, and beef.

It is clear that the woolgrower is one of the very few remaining of the agricultural community who can benefit tremendously from production research programs of the United States Department of Agriculture and other agencies to increase the efficiency and capacity of wool production. The sciences of genetics, parasitology, animal health, and land management, etc., still have some very important contributions to make to wool production before the domestic woolgrower can consistently outrun the capacity of the economy to consume what they produce. As far as future wool production is concerned, it is worthwhile to note in passing that the United States Department of Agriculture tentatively projected the following in November 1956 for the wool and mohair task group:

[1] The other type of wool is known as carpet wool and ranges in diameter from 1.5 x 10^{-3} inch and below.
[2] Dutiable, the rate depending upon fiber diameter or fineness.
[3] National Wool Act of 1954, sec. 702.

Future United States production, apparel wool (clean basis)

[In million pounds]

	Current tariff rate and controls [1]	Current tariff rate, no controls
1960	145	130
1965	150	125
1975	155	120

[1] Wool Products Labeling Act of 1939; National Wool Act of 1954.

These tentative projections on wool production reflect only certain economic assumptions, e. g., increases in population and disposable personal income, etc., but do not take into account possible advances in the efficiency and capacity of wool production brought about by research.

The competition of other fibers is due to increasing production, promotion, and improvement through research of the noncellulosic fibers and this leads us to an analysis of the decline of wool consumption.

4. THE DECLINE IN WOOL CONSUMPTION OR UTILIZATION IN UNITED STATES

Since 1946, wool consumption by the textile mills has shown a steady decline. This is true even when the effects of the Korean crisis during the 1950–53 period is taken into account. The data in table II allow a comparison since 1950 between the yearly United States mill consumption of wool (apparel and apparel plus carpet wool) with that of some other major (manmade) textile fibers.

As a basis for discussion, it is proper to consider only that portion of the noncellulosic fibers which is processed singly and as multicomponent mixtures, sometimes including wool, into woollike yarns and fabrics on traditional woolen and worsted equipment. The exact amount of these fibers, so consumed, is unknown at present, but quantitatively it is a very significant part of the whole, appearing in fabrics which are highly competitive with those made of 100 percent wool.

It can be seen that accompanying the declining trend in both apparel [4] and carpet wool consumption is the steadily rising consumption of the noncellulosic fibers. The dramatic rise in the consumption of noncellulosic fibers as a group and the somewhat declining consumption of wool (apparel and carpet) is best illustrated graphically by plotting as a function of time the percent of total poundage of all fibers consumed in United States mills represented by these two groups. This is shown in figure 2. Noncellulosic fibers rose from 1.7 percent of total poundage consumed in 1950 to 7.6 percent in 1957. On the other hand, wool declined from 9.5 percent in 1950 to a 2-decade low of 6 percent in 1957.

Figure 3 shows the dramatic rise in consumption of new noncellulosic fibers in relation to all types of textile fibers consumed in the past three decades. The declining trend in the consumption of all types of wool is also reflected in United States civilian per capita consumption which was 4.2 pounds per person in 1950, 2.6 pounds in 1956 and only 2.2 pounds per person in 1957. The figures for noncellulosic fibers in the same years are respectively 0.9 pound, 2.7 and 3.3 pounds per person. The new noncellulosic fibers which are invading traditional wool markets rose in per capita consumption to 2.8 pounds in 1957, an increase of 275 percent over 1950; the consumption of these fibers being zero prior to 1940. Current and past prices of some of the principal noncellulosic fibers which have invaded traditional all-wool markets and those of main grades of apparel wool are given in table III.

It is clear from table III that at present the typical apparel wools, both imported and domestic, are competitive pricewise with the noncellulosic fibers, but this was not only the case only several months ago. Even with today's lower prices the demand for wool by the mills is not overwhelming and it is known that during the first quarter of 1958 apparel wool consumption by the mills is off over 20 percent compared with the same period in 1957. While it is true that the textile industry has suffered a recession for several years and this has been depressed further by the current economic situation, it cannot be overlooked that within this framework the noncellulosic fibers have been gaining rapidly at the expense of wool.

[4] Apparel wool consumption in 1956 was approximately 6 percent greater than in 1955.

What are the reasons for this? One reason is that certain inherent desirable properties of these fibers and their fabrics are being extensively promoted. Some of these properties are moth resistance, shrink resistance (in laundering) and ability to hold pleats and creases under extreme conditions. Further, yarn and fabric manufacturers are provided with manmade fibers of uniform qualities together with detailed information for processing these fibers, singly or in blends with wool, on traditional wool machinery.

In addition to supplying excellent technical service and dynamic promotional programs, the producers of manmade fibers are engaged in intensive research and development programs. It is estimated that the major producers of manmade fibers competing with wool are reinvesting in research and development up to 3 cents of every sales dollar—the total is "guesstimated" to be $50 million to $60 million annually. This research is aimed at stimulating both immediate and future sales and, as can be seen from tables II and III, is highly effective.

Some idea of the extent to which noncellulosic and rayon fibers have invaded traditional 100 percent wool areas can be obtained from the following:

(*a*) Blankets—estimated displacement of wool—20 million pounds per year.

(*b*) Summer suits:

(1) "wash and wear" garments accounted for 13 percent of all sales in 1956 and were estimated to account for 17 percent in 1957.

(2) Dacron (55 percent)-wool (45 percent) blends accounted for 31 percent of sales in 1956 and was higher still in 1957.

(*c*) Other goods, such as knitted outerwear, carpets and upholstery have shown similar situations.

The distribution of wool consumed in the United States in 1955 according to end-product use is shown in figure 4.

Paralleling the decline in wool consumption and rise in noncellulosic fiber consumption in recent years in the United States has been a reduction in the number of mills producing wool products. As the result of liquidations and mergers, the total number of establishments in all divisions of the wool-manufacturing industry declined from 828 in 1947 to 643 in 1954. The total value of woolen and worsted products shipped by fabric mills declined 34 percent, from $1,356 million in 1947 to $890 million in 1954. This contraction has persisted right up to the present time and is partially attributable to increases in recent years in the importation of wool fabrics.

Although all are not discussed above, the following is a summary of the factors contributing to the decline of raw wool consumption in United States mills and these answer the question put earlier:

1. Increased blending of wool with other fibers, with production of fewer end products made of wool.
2. Lighter weight fabrics.
3. Imports of wool fabrics.
4. Recurrent noncompetitive prices with substitute fibers (affected by world supply and demand relationship and tariffs).
5. High promotional expenditures of competitive fiber producers.
6. Extensive research activities of competitive fiber producers resulting in improvements in fiber processing and fabric performance.
7. Development of new fibers and processes to make these fibers wool-like, e. g., texturized multicontinuous filament yarns.
8. Dynamic styling of fabrics made of competitive fibers.
9. Declining proportion of consumer incomes being spent on textiles.

Future utilization of wool

I mentioned at the beginning of this presentation that increased wool production with a corresponding expansion of the market outlets for wool is vital, not only for a healthy economic outlook for the woolgrowers of the United States, but also to our national security. It will be remembered that following the outbreak of the Korean conflict, the lack of sufficient domestic supply of wool for military needs caused a panic in wool prices. Looking back further to World War II, we imported two-thirds of our wool requirements from production centers located six to twelve thousand miles away from such places as Australia, New Zealand, South Africa, and South America. This was evident during World War II, when our Armed Forces fought from island to island in the Pacific to prevent Japan from cutting our wool-supply route from Australia and New Zealand.

Since World War II and the Korean conflict, and the panic in wool prices associated with the latter situation, there has been a considerable loss of traditional wool markets to other fibers and this is still being felt by the wool industry.

This raises the question, "Are there synthetic fibers available which could completely replace wool?" The answer to this question at present and in the foreseeable future is in the negative, particularly for military apparel fabrics. The main difficulty with the noncellulosic synthetic fibers for military items, as well as for civilian use, is their property to melt at relatively low temperatures. This deficiency is experienced every day by people who drop glowing cigarette ashes on apparel made of the noncellulosic fibers and find holes in their clothing and it was devastatingly demonstrated in a recent atomic test (Operation Cue) in Nevada. The undesirable nature of the synthetic thermoplastic fibers in clothing was well publicized in data presented in the Journal of the American Association of Textile Chemists & Colorists and other publications. This inadequacy, and others, of synthetic fibers in military clothing has also been brought out in many reports published by the Office of Technical Services of the Department of Commerce.

While the military offices are to be commended for looking for substitutes for wool, they have found that it is necessary to limit the use of noncellulosic fibers in some military items to 15 percent. It bears repeating here that one of the main reasons for the fiasco of the German Army in their conflict with Russia was caused by lack of proper clothing in the severe Russian winter. In 1944 the wool content of the German Army uniform was 35 percent pure wool.

One cannot help but come to the conclusion that the woolgrowing and wool manufacturing industry in the United States are vital to our existence. I have given the reasons why we have witnessed a steady shrinkage in the domestic woolgrowing and wool manufacturing industries in the past two decades. And now I would like to briefly discuss with you how we may be able to bring about a reversal of this most undesirable situation. It becomes obvious that the only ways to accomplish these goals are—

(1) Bring about improvements in the efficiency and capacity of wool production so that more and higher quality domestic wool becomes available at prices more competitive with other fibers.

(2) Bring about reductions in the manufacturing cost of wool products coupled with new and/or improved performance characteristics and styles in the end products to meet current consumer demands.

If these primary conditions are satisfied, it would still be necessary for increased utilization to expand present promotional activities in behalf of wool, including intensive education at the school level.

Contingencies (1) and (2) above are primarily scientific research problems. Another approach, however, has been taken to increase and improve the quality of wool production through the National Wool Act of 1954. Recognizing the growing plight of the domestic industry and its importance to our national welfare and security, the National Wool Act, inaugurated in 1954 in lieu of increased tariffs, was directed toward encouraging return of domestic production to a higher level and restoration of wool to a free market basis.

The act directs an incentive payment for wool up to 110 percent of parity until March 1959. Payments are graduated in such a way as to stimulate production of higher quality wools. The initial goal is production of 165 million pounds of wool per year (clean basis) which is one-third more than the 1950–54 yearly production average. Although wool production has not shown any significant rise since the act became effective in 1955, this is believed to be due to the widespread drought of recent years.

The research approaches for increasing wool production and improving the competitive price of raw wool are adequately covered in the program of the United States Department of Agriculture under such headings as sheep breeding, sheep feeding and nutrition, sheep physiology, sheep management, sheep diseases and parasites, range management and improvement and economics of production, etc. A discussion of these topics is beyond the scope of this presentation, but it might be noted that acceleration of this program is considered vital if the results of the program are to be effective. It has been plausibly suggested that an expanded woolgrowing industry provides alternative use of land, submarginal for crop production, some of which is now producing surplus grains.

The Wool and Mohair Task Group's report of the President's appointed Bipartisan Commission on Increased Industrial Use of Agricultural Products outlines a fully rounded utilization research program to increase the use and usefulness of wool. The program covers the fields of: (1) fleece- fiber- and fabric-modification research, (2) product engineering and development, and (3) necessary basic research on fabric and machine engineering, and on the structure and behavior of

wool from its cellular components down to the architecture of its protein molecules. The objectives of the program are—

(1) To provide woolgrowers and wool manufacturers with basic information on the level of importance of fiber shape factors, e. g., crimp, diameter, and length, in manufacturing efficiency and product performance;

(2) to provide manufacturers with information on how to modify wool (chemically and physically) on a commercially feasible basis to yield such desired product characteristics as permanent moth-resistance, permanent shrink-resistance, permanent pleats, higher wrinkle-resistance and resistance to chemicals and micro-organisms;

(3) to provide new and more economical methods for converting raw wool into finished fabrics;

(4) to develop more uses (end products) for raw wool and its waste materials.

Further details of this program can be obtained from the Wool and Mohair Task Group report, but it is worth while to note that the Department of Agriculture now is building a complete and accessible pilot plant so necessary for translating laboratory developments into practical mill operations. Assuming that this program is implemented shortly, on the scale outlined, and that wool production is encouraged through the results of production research and the National Wool Act, there is every reason to believe that wool utilization will significantly increase in the United States in the coming years. If the research and development program outlined here for increasing the utilization of wool is supported and the results of such a research program are brought to practical fruition while the promotional and educational programs in behalf of wool are maintained and extended, there is every reason to believe that wool production and utilization will significantly increase in the United States so that our woolgrowing community will be in a healthier economic condition and our national security will be strengthened to an extent which is not generally appreciated.

TABLE I.—*Recent United States production of some major textile fibers*

[Millions of pounds]

	Wool (apparel, clean basis) [1]	Noncellulosics (staple, tow and yarn) [2]	Rayon and acetate (staple, tow and yarn)	Cotton	Textile glass fibers
1954	136	284.6	1,085.7	6,574	59.2
1955	134	379.3	1,260.7	7,066	75.8
1956	132	400.3	1,147.9	6,174	96.5
1957	128	515.6	1,139.4	4,000	109.6

[1] The average yearly United States apparel wool production during the 1930-39 period was approximately 185 million pounds.

[2] The following fibers are classified as noncellulosics: acrylic and acrylic-type, dinitrile, polyamide, polyester, polyethylene, polypropylene, polystyrene, polyvinyl acetate, polyvinyl alcohol, polyvinyl chloride, polyvinylidene chloride, protein, tetrafluorethylene and other fibers.

FIGURE 1.

DOMESTIC PRODUCTION AND IMPORTS RELATED TO MILL CONSUMPTION OF APPAREL WOOL IN THE U. S.

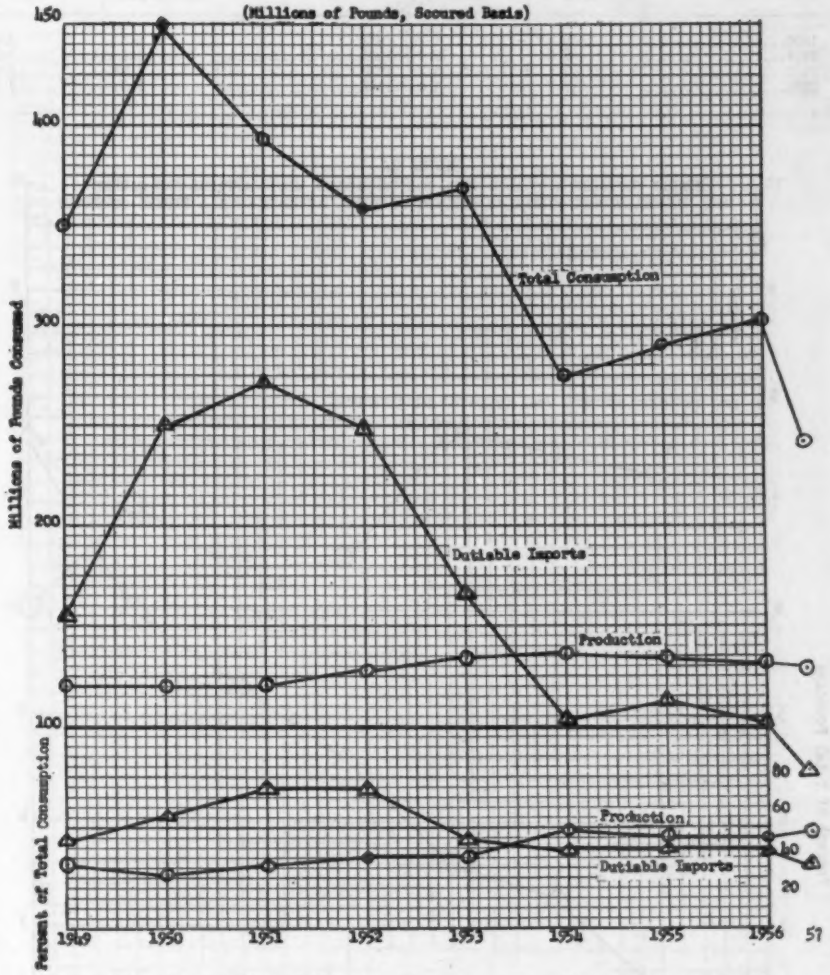


TABLE II.—*Recent United States mill consumption of the major textile fibers*

[Millions of pounds]

	Wool (apparel only, clean basis) [1]	Wool (apparel and carpet, clean basis) [1]	Noncellulosic [2]	Rayon and acetate [2]	Cotton [2]	Total (including silk and textile glass fibers) [2]
1950	449	647.0	119.2	1,351.6	4,680.1	6,827.6
1951	393	495.0	164.9	1,276.6	4,846.8	6,819.5
1952	358	477.5	208.2	1,215.5	4,437.1	6,386.1
1953	368	503.8	232.9	1,223.0	4,521.0	6,532.8
1954	275	389.9	274.0	1,154.8	4,125.2	6,008.4
1955	290	428.2	355.2	1,419.2	4,384.2	6,665.6
1956	297	454.9	389.0	1,201.1	4,332.3	6,473.6
1957	243	372.0	470.2	1,177.5	4,043.5	6,168.8

[1] Includes shorn, pulled and small quantities of wool used for manufacturing of pressed felts and that spun on the cotton system.

[2] Textile Organon, March 1958.

Percentage of all fibers consumed

	Wool (apparel and carpet)	Noncellulosics		Wool (apparel and carpet)	Noncellulosics
1950	9.5	1.7	1954	6.5	4.6
1951	7.3	2.4	1955	6.4	5.3
1952	7.5	3.3	1956	7.03	6.0
1953	7.7	3.6	1957	6.03	7.6

FIGURE 2.

YEARLY COMPARISON OF U.S. MILL CONSUMPTION OF WOOL (APPAREL AND CARPET) AND NON-CELLULOSIC FIBERS AS PERCENT OF TOTAL POUNDAGE OF ALL FIBERS CONSUMED

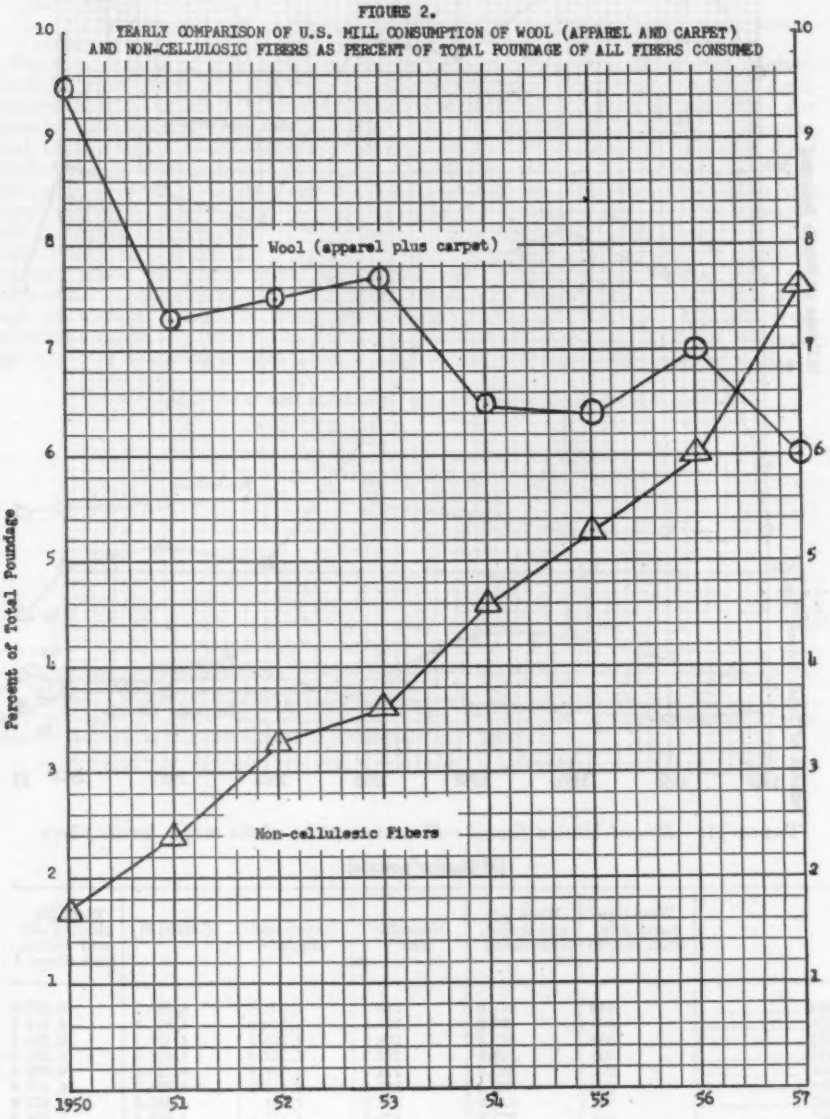


TABLE III.—*Price per pound of some major textile fibers* [1]

[In cents]

	Latest price, May to date	1953 average
Nylon, polyamide (staple and tow) crimpset 3 denier	128	180.0
Orlon, acrylic (staple) 3 denier	128	190.0
Acrilan, acrylic (staple) 3, 5 denier	116	185.0
Dynel, acrylic (staple) 2, 3, 6, 12, 24 denier	105	128.0
Dacron, polyester (staple and tow) 3, 4.5, 6 denier	141	180.0
Rayon, acetate (staple) 5 denier	34	34.0
Rayon, viscose (staple)	31	
Wool, domestic, fine, staple (64's, 70's) clean basis	115	173.0
Wool, Australian, 64's, 70's clean basis (duty paid)	148	202.2
Wool, domestic, ⅜ blood, combing (56's, 58's), clean basis	95	132.3
Wool, Australian, 58's, 60's, clean basis (duty paid)	133	172.9

[1] Weekly Review of the Boston Wool Market (USDA); Modern Textile Magazine.

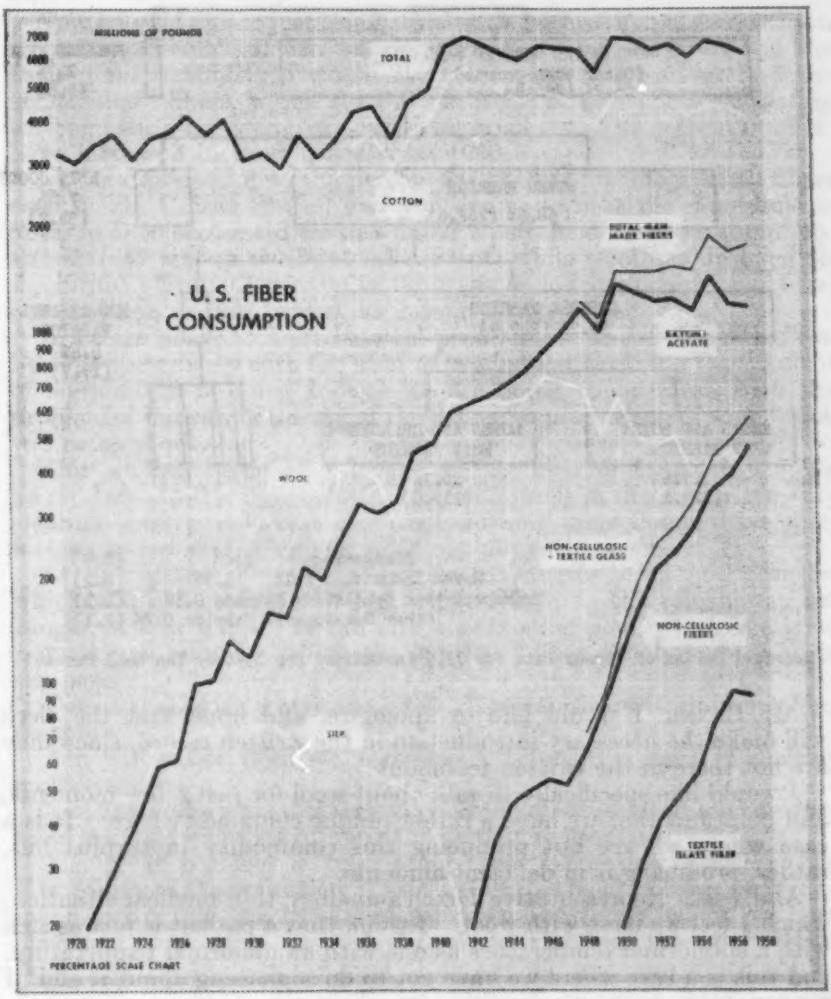
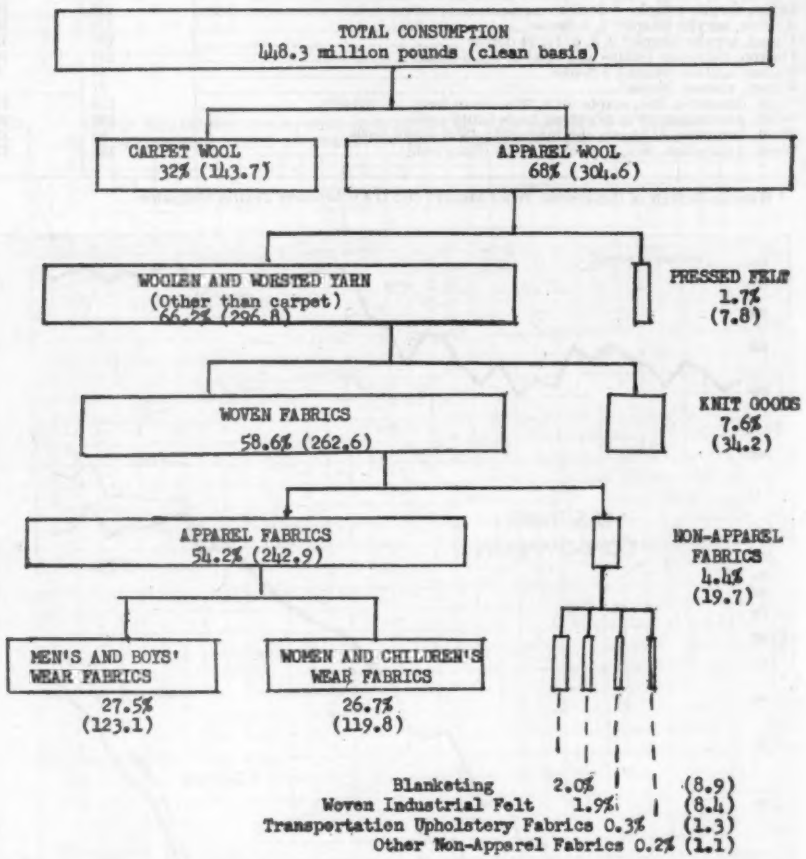


FIGURE 4.

DISTRIBUTION OF

WOOL CONSUMPTION IN U. S.

1956



Source: Bureau of Census Data for 1949 (estimated for 1956 by The Wool Bureau)

Mr. LAXER. I would like to apologize, and hope that the clerk will make the necessary introduction in the written record, since they are not there in the written testimony.

I would like specifically to talk about wool for just a few moments, and point out that we have a rather unique commodity here. It is a case where we are not producing this commodity in surplus but, rather, producing it in deficient amounts.

And I like Representative Dixon's analogy to a medical situation, which I feel we have with wool. I think that a patient is just as sick with a subnormal temperature as one with an abnormal temperature, and this is a case where we have got to do something about it and, if we can, increase our production of wool.

Here is an ideal commodity, I think, which will help in this surplus problem. Certainly one of the recommendations made by the wool and mohair task group was that there is the possibility of taking land which is now being used for producing commodities in surplus, and turning that land into the production of wool.

Why is wool so important to us? It is important if you reflect back to World War II where our soldiers and sailors fought across the Pacific Ocean, one of the reasons being to keep the lifelines open to Australia and New Zealand where we could import wool for our clothing, for both our Armed Forces and civilians.

The Armed services today are looking for substitutes for wool, and cannot find any really, and they are limited to using about 10 or 20 percent in blended fabrics, mainly because the synthetic fibers will not stand up to the heat, and so forth, which these fabrics are subjected to.

Now I would like to just briefly deal with the problem of competition of synthetic fibers. If you will just turn, if you will, to figure 2 at the back of the testimony, I would like you to just look and see how the noncellulosic fibers, which are the synthetic fibers wool is competing with and the fibers which are displacing wool out of its current market, have increased in their usage since 1950.

I have expressed it as the percentage of total poundage of all fibers used in the United States, and you can see where the noncellulosic fibers in 1950 accounted for just under 2 percent of total consumption, and in 1957 are up to about 7.5 percent; while wool has dropped off significantly from 9.5 percent in 1950, and is down to 6 percent of total consumption in 1957, a very serious situation indeed.

If we are going to increase wool production—and I think this can be done very nicely with the kind of production work the Department of Agriculture is doing today—we are going to be faced with the problem of increasing the use of the increased production of wool which will come about.

This can only be done by developing new uses for the product. We do not have to find new outlets. We can use it in the clothing we are wearing today, and make our wool clothing more competitive, performancewise, with clothing made out of synthetic fibers.

As an instance, we can put permanent creases in all-wool trousers which will not come out if you expose them to the rain if you get caught in it or happen to fall into a swimming pool, which is a good promotional gimmick which the synthetic fiber people have used in the past.

You can make wool nonshrinking. You can throw it into a washing machine.

You can make wool stain resistant. You can make it durably moth resistant.

You can make wool clothing as good today, at least on a laboratory scale, as good as any synthetic fabric that is produced.

The great problem is translating these laboratory developments into commercial application. And so, on this basis, I heartily recommend to you that this legislation set down here today, which has been discussed here today, be pushed forward, and that the wool picture be included mainly as the kind of an agricultural crop which can be increased which is produced in deficient amounts today, where

products which are produced in sulprus can be eliminated to some extent, and the wool picture increased.

I think generally that is all I have to say, Senator.

The CHAIRMAN. Thank you.

Dr. Evans, please.

STATEMENT OF JAMES W. EVANS, DIRECTOR OF RESEARCH, AMERICAN MAIZE PRODUCTS CO., ROBY, IND.

Mr. EVANS. Mr. Chairman and members of the committee, I will identify myself. My name is James W. Evans. I live in Highland, Ind., and I am research director of the American Maize Products Co., located in Roby, Ind.

I appear before you today in support of S. 2306 on behalf of the corn refining industry as chairman of a task group of the technical advisory committee of the Corn Industry's Research Foundation, Inc.

The Corn Industry's Research Foundation, Inc., is an incorporated nonprofit national organization representing the 11 firms comprising the corn-refining industry of the United States, governed by a board of trustees comprised of 1 official from each of the 11 corporate members.

The foundation conducts industrywide programs of research, technical service, and public information on the industry's behalf.

The technical advisory committee of the Corn Industry's Research Foundation, Inc., is made up of the industry's top chemical research executives, each member company having one voting representative.

This committee guides the program of and for the research committee of the foundation's trustees.

There is a report, which you have in your hands, and I am just going to read excerpts from that.

It has been said that the industry which I represent, the corn-refining industry—or it is also known as the corn wet milling industry—supplies materials to some 60 other food and nonfood industries.

We manufacture specialty forms of starches and sugars and sirups tailor made, so to speak, for the particular needs of our customer industries. They in turn use our products either as ingredients of the goods they are making or as important processing aids in their manufacturing operations.

Up until a short time ago, and even today, I daresay, in the case of many people, the average person thought of cornstarch mainly as a foodstuff or as a sizing agent. During the early years of our industry's century of existence, production was aimed in those directions.

Gradually we found other uses for the parts of the corn kernel. Today, for instance, our plants market about a million tons of animal and poultry feedstuffs a year. These are made primarily from the hulls and gluten from the kernel. It was not until comparatively recently that products from corn began to find their way into various nonfood supply uses in a big way.

I should add, incidentally, that the steady growth of the industry has paralleled quite closely development of new products and new uses. These developments have been brought about through research, good hard work in the research laboratories of the individual companies, and cooperative studies by the industry as a whole through its research foundation.

In the past three decades, several technological break-through points have been achieved by the corn wet milling industries. Among these are developments such as utilization of starch in paper coatings, which seems commonplace today but which was not even dreamed of 50 years ago.

Other breakthrough points of this kind include development of techniques for complete hydrolysis of starch, that is, complete conversion of starch into sugars in much the same way that the human digestive system changes starch into dextrose or blood sugar, crystallization of dextrose from hydrolysis, and the creation of food and nonfood uses for dextrose, inclusion of dextrose in corn sirups in standardized food products, utilization of starch in corrugated boxboard manufacture, production of sirups by enzymatic hydrolysis of starch, utilization of starch in oil well drilling, development of foundry core binders from starch.

As I said, developments such as these have played an important part in increasing the industrial consumption of corn. Our plants use as their basic raw material the field corn, sometimes called dent corn, which is the leading crop in so many States and is, in fact, the only commercial crop grown in every State of the Union.

In an average year, the corn wet milling industry's grind amounts to 140 million bushels. Prior to World War II, the rate of grind was well below 100 million bushels. The grind passed the 100-million-busbel mark for the first time in 1941.

Despite the size of the grind, it is only a small fraction of the annual corn crop. Knowing what research bas done in the past, we believe new ideas, new research, the creation of new products, can lead to industrial utilization of a much greater proportion of our annual crop.

Through effective use of greatly expanded basic and applied research programs, new products and new uses for these products can be developed which will increase the demand for corn sufficiently to eliminate the crop surplus. This is our opinion after considering the question conservatively with our feet on the ground.

Let me point out parenthetically that corn research is by no means a new proposition as far as our industry is concerned. In addition to the basic and applied research work carried out by the several companies individually and competitively, our industry also cooperates in promoting fundamental research.

Through the allocation of grants by the corn industry's research foundation, through scientists in universities, Government laboratories and private science centers, we have already built sound groundwork for the type of future research that S. 2306 could provide.

We recognize the essentiality of gaining more fundamental knowledge in the granular and molecular structure of starch, interrelation of starch to metallic irons, effects of new enzymes and microorganisms on starch, and numerous other biological facts.

This kind of information is an essential prerequisite to new product development. For this reason, the first proposal of the Corn Industry's Research Foundation calls for much more fundamental research spread out over 15 years at the cost of a million dollars a year.

This would provide the basis for the nine practical projects we have suggested. Detailed discussions of these proposals may be fouud in our report, Suggested Research Projects for Increased Industrial Uses of Corn or Products From Corn.

This report, together with a supplemental discussion dated February 4, 1957, we are pleased to offer as an addition to the record.

As examples of the studies we propose and the potentials for increased consumption of corn which are foreseen, 3 of the 9 "use projects" can be mentioned briefly.

These are: Utilization of starch in the metallurgical industries; use of starch in insecticide and defoliating formulations; and use of starch as an integral part of paper, that is, in addition to its present use as a sizing or coating agent.

These 3 projects would cost an estimated $6.5 million, and could lead to an annual consumption of some 410 million bushels of corn.

That amount, incidentally, is nearly three times the present grind of the corn-wheat millers and at least twice the present capacity of our industry.

Projects such as these are discussed in the report made to the Congress by the Commission, and they fall easily within the scope and philosophy of S. 2306. We have examined Senator Curtis' bill and are satisfied that it is a well-considered plan for the legislative implementation of the Commission's report.

In drawing up our recommendations, our task group based its work on certain premises which further justify, in our opinion, the type of research program which S. 2306 will make possible.

We can all recognize, for example, that the American public is basically well fed. Moreover, further improvement in domestic human nutrition is likely to be along the line of increased protein and vitamin intake, with little or no increase in the carbohydrate intake. This would preclude any substantially increased use of corn for human nutrition.

Consumption of corn surpluses will therefore have to be largely in nonfood uses. It so happens, however, that the major present uses for products made from corn are in the food industry. In light of these considerations you can be assured of our industry's active interest in the program envisaged by S. 2306. One feature of the bill which we deem especially meritorious is the provision it makes for encouraging the training of scientists needed to perform services in furthering the research effort to develop greater industrial uses for agricultural commodities. This is a logical tie-in with the current new emphasis being placed on building up America's scientific manpower.

To accomplish the kind of research effort that has been proposed—what Senator Capehart has so aptly described as a "crash program for agriculture"—would require expenditures quite beyond the capabilities of our industry. We also recognize the validity of the provisions made in the Commission's report and S. 2306 for incentives, both to agriculture and industrial enterprises, as means of furthering the program objectives.

Our hope, however, is that expsnsion of our plants, operations and markets will be geared not to artificial incentives or temporary conditions, but to sound and gradual future growth.

Since World War I, the historical development of our industry has been conservative in nature, based primarily on large volume, close profit margins and stable and continuing markets. Conceivably, there could be a problem of expansion in corn refining plant facilities if an aggressive, full-scale research program started to produce spectacular but temporary results.

The rather large capital investment of $1,000 per bushel per day for increased capacity, at current prices of buildings and machinery, must be reckoned as an economic barrier unless there is a definite probability of an appreciable and continuing increase in the grind of corn.

When that time comes, our industry would desire to build and finance its own plants with its own funds and credit, and with its own resources of labor and managerial experience. It is not beyond the realm of possibility, however, that the results of an all-out research effort may bulk so large as to justify some kind of Government financial assistance, such as rapid tax amortization on a specific project basis.

I would like to close by saying the research will not be an overnight panacea in solving the problem of corn surplus, but the objective warrants an immediate and vigorous attack by the combined forces of government, the colleges and universities, and industry. We recommend the principle of an accelerated research program and give our strong endorsement to S. 2306.

The CHAIRMAN. Thank you, sir; any questions?

(Mr. Evans' prepared statement is as follows:)

My name is James W. Evans. I live in Highland, Ind., and I am research director of the American Maize-Products Co., Roby, Ind. I appear before you today in support of S. 2306 on behalf of the corn-refining industry as chairman of a task group of the technical advisory committee of the Corn Industries Research Foundation, Inc.

The Corn Industries Research Foundation, Inc., is an incorporated nonprofit national organization representing the 11 firms comprising the corn-refining industry of the United States. Governed by a board of trustees comprised of 1 official from each of the 11 corporate members, the foundation conducts industry-wide programs of research, technical service, and public information on the industry's behalf. The technical advisory committee of the Corn Industries Foundation, Inc., is made up of the industry's top chemical-research executives, each member company having one voting representative. This committee guides the program of and for the research committee of the foundation's trustees.

The industry which I represent supplies materials to some 60 food and nonfood industries. Specialty forms of starches, sugars, and sirups are manufactured for the particular needs of the customer industries. They use these products either as ingredients or as important processing aids in their manufacturing operations.

Until a short time ago the average person thought of cornstarch mainly as a foodstuff or as a sizing agent. During the early years of the corn wet-milling industry's century of existence, production was aimed in those directions. Gradually other uses were found for the products obtained from corn. Today, for instance, the industry markets about a million tons of animal and poultry feedstuffs a year; these are made primarily of the hulls and gluten from the corn kernel.

It was not until comparatively recently that products from corn began to find their way into various nonfood industrial uses in a big way. The steady growth of the industry has paralleled quite closely the development of new products and new uses. These developments have been achieved through good hard work in the research laboratories of individual companies and cooperative studies by the industry as a whole through its research foundation.

In the past three decades, several technological breakthrough points have been achieved by the corn wet-milling industry. Among these are developments, such as the utilization of starch in paper coatings, which seem commonplace today but were not even dreamed of 50 years ago. Other breakthroughs of this kind include:

Development of techniques for the complete hydrolysis of starch, that is, the complete conversion of starch into sugar in much the same way that the human digestive system changes starch into dextrose, or blood sugar.

Crystallization of dextrose from hydrolyzates, and creation of food and nonfood uses for dextrose.

Inclusion of dextrose and corn sirups in standardized food products.

Utilization of starch in corrugated box board manufacture.

Production of sirups by enzymatic hydrolysis of starch.
Utilization of starch in oil-well drilling.
Development of core binders from starch.

Developments such as these have played an important part in increasing the industrial consumption of corn. The corn wet-milling plants use as basic raw material the field corn, sometimes called dent corn, which is the leading crop in so many States and is in fact the only commercial crop grown in every State of the Union. In an average year the corn wet-milling industry's grind amounts to some 140 million bushels. Prior to World War II the rate of grind was well below 100 million bushels. The grind passed the 100 million bushel mark for the first time in 1941.

Despite the size of the grind it is only a fraction of the annual corn crop. Knowing what research has done in the past, it is believed that new ideas, new research, the creation of new products, can lead to industrial utilization of a much greater proportion of the annual crop.

What is being considered in this hearing today is the corn surplus—the largest on record, now around 1 billion bushels of corn over and above a reasonable carryover. That billion bushels, plus carryover of somewhere near 500 million, plus an annual crop that runs around 3 billion, add up to roughly 4½ billion bushels.

In a fairly typical year, such as 1957, total utilization of corn amounts to about 3.1 billion bushels. Of that amount, some 2.7 billion bushels go into livestock feed, 110 million bushels exported, 12 million used to seed the new crop, and the remainder of about 250 million is processed by industry—the wet millers, dry millers, and the alcohol and distilled spirits industry. This total utilization, along with a working carryover of from 400 million to 500 million bushels, leaves the billion-bushel surplus as excess, previously noted.

Through effective use of greatly expanded basic and applied research programs, new products and new uses for these products can be developed which will increase the demand for corn sufficiently to eliminate the crop surplus. This is our opinion after considering the question conservatively.

Corn research is by no means a new proposition as far as the corn wet-milling industry is concerned. In addition to the basic and applied research work carried out by the several companies individually and competitively, the industry also cooperates in promoting fundamental research. Through the allocation of grants by the Corn Industries Research Foundation, Inc., to scientists in universities, Government laboratories and private science centers, sound groundwork has been built for the types of future research that S. 2306 could provide.

Recognition is given the necessity of obtaining more fundamental knowledge in the granular and molecular structure of starch, interrelations of starch with metallic ions and other colloids, effects of new enzymes and microorganisms on starch, and numerous other chemical, physical and biological facts. To gather this kind of scientific information is an essential prerequisite to new product development.

For this reason the first proposal of the Corn Industries Research Foundation, Inc., calls for much more fundamental research, spread out over 15 years at a cost of $1 million a year. This would provide the basis for the nine practical projects we have suggested. Detailed discussions of these proposals may be found in our report, Suggested Research Projects for Increased Industrial Uses of Corn or Products from Corn. This report, together with a supplemental discussion dated February 4, 1957, we are pleased to offer as an addition to the record.

As examples of the studies we propose, and the potentials for increased consumption of corn which are foreseen, 3 of the 9 use projects can be mentioned briefly. These are utilization of starch in the metallurgical industries, use of starch in insecticide and defoliating formulations, and use of starch as an integral part of paper (in addition to its present use as a sizing or coating agent). These three projects would cost an estimated $6.5 million and could lead to an annual consumption of some 410 million bushels of corn.

That amount, incidentally, is nearly three times the present grind of the corn wet millers and at least twice the present capacity of our industry.

Projects such as these are discussed in the report made to the Congress by the Commission, and they fall easily within the scope and philosophy of S. 2306. We have examined Senator Curtis' bill and are satisfied that it is a well-considered plan for the legislative implementation of the Commissions' report.

In drawing up our recommendations, our task group based its work on certain premises which further justify, in our opinion, the type of research program which S. 2306 will make possible.

We can all recognize, for example, that the American public is basically well fed. Moreover, further improvement in domestic human nutrition is likely to be along the line of increased protein and vitamin intake, with little or no increase in carbohydrate intake. This would preclude any substantially increased use of corn for human nutrition.

Consumption of corn surpluses will therefore have to be largely in nonfood uses. It so happens, however, that the major present uses for products made from corn are in the food industry. Only about 35 percent (45 million bushels) of present production is consumed in nonfood applications.

In light of these considerations, you can be assured of our industry's active interest in the program envisaged by S. 2306. One feature of the bill which we deem especially meritorious is the provision it makes for encouraging the training of scientists needed to perform services in furthering the research effort to develop greater industrial uses for agricultural commodities. This is a logical tie-in with the current new emphasis being placed on building up America's scientific manpower.

To accomplish the kind of research effort that has been proposed—what Senator Capehart has so aptly described as a "crash program for agriculture"—would require expenditures quite beyond the capabilities of our industry. We also recognize the validity of the provisions made in the Commission report and S. 2306 for incentives, both to agricultural and industrial enterprises, as means of furthering the program objectives.

Our hope, however, is that expansion of our plants, operations and markets will be geared not to artificial incentives or temporary conditions, but to sound and gradual future growth. Since World War I, the historical development of our industry has been conservative in nature, based primarily on large volume, close profit margins, and stable and continuing markets. Conceivably, there could be a problem of expansion in corn refining plant facilities if an aggressive, full-scale research program started to produce spectacular but temporary results.

The rather large capital investment of $1,000 per bushel per day for increased capacity, at current prices of buildings and machinery, must be reckoned as an economic barrier unless there is a definite probability of an appreciable and continuing increase in the grind of corn.

When that time comes, our industry would desire to build and finance its own plants with its own funds and credit, and with its own resources of labor and managerial experience. It is not beyond the realms of possibility, however, that the results of an all-out research effort may bulk so large as to justify some kind of Government financial assistance, such as rapid tax amortization on a specific project basis.

Research will not be an overnight panacea in solving the problem of the corn surplus; but the objective warrants an immediate and vigorous attack by the combined forces of Government, the colleges and universities, and industry. We recommend the principle of an accelerated research program and give our strong endorsement to S. 2306.

The CHAIRMAN. Is Dr. Faucett present?

Step forward.

STATEMENT OF JAMES W. FAUCETT, DIRECTOR OF MANUFACTURING AND ENGINEERING, TAKAMINE DIVISION OF MILES LABORATORIES, CLIFTON, N. J.

Mr. FAUCETT. I will identify myself as J. W. Faucett. I spent about 25 years in the processing of crops. Presently I am director of manufacturing and engineering, Takamine division of Miles Laboratories producing zein, fine chemicals for industry and pharmaceutical use. I have a prepared statement. I can highlight it.

Our dynamic industry in the United States, outstanding in the world, has been successful in developing and growing because of new products, new methods, and new know-how. The increased productivity and better products are all a result of research and development of one kind or another, in science, in engineering, or in marketing.

Large sums have been and are being spent, and spent wisely by industry to maintain this rate of achievement. However, agriculture has not only developed more slowly but has actually lost important markets to the more aggressive synthetic chemical industries. Examples of loss of markets for agricultural crops to synthetic chemicals are alcohol, fibers, detergents, pharmaceuticals, coatings, etc.

Some very important advances have been made in agriculture in the past few decades; however, most of these advances have been in better strains of seed and higher yields per acre. We need new crops, new processes for making more products from crops, and effective marketing of these new products.

The wet-corn milling industry is a good example of an excellent start in developing through research industrial utilization of one of our surplus crops, but it has more to do. Today, products from corn go into manufacturing organic acids, antibiotics, wallboard, furfural, starches and dextrins, dextrose, zein, vegetable oil, and aninal-feed supplements. The starches, dextrins, dextrose, and zein are in turn used in various fields of industry, i. e., textiles, paper, adhesive, ink, plastics, fibers, films, coatings, etc. However, if corn is to compete with other raw materials more and more research and development work must continue.

A good start has been made on chemical utilization of cotton which is now going into plastics, fibers, films, explosives, and cellulosic products such as carboxymethyl cellulose; on the other hand, some of these, such as rayon, lacquers, films, etc., have been pushed from markets by competitive nonagricultural products resulting from research effort backed by ample funds.

The soya bean is a good example of a new major crop, unknown in the United States a few decades ago, which has contributed much to our economy. But it, too, is being pushed out of markets and lack of research has resulted in no new markets or new products for soya beans. There are undoubtedly many other crops that could be at least as valuable as soya beans if their potentials were known and investigated.

Gallant efforts have been made by the Research Laboratories of the Department of Agriculture to investigate new potentials for our crops. Their contribution to penicillin production is an example of what can be done by Government laboratories. The fine work on processing wheat to separate the gluten from the starch is another example, and I am convinced that this agricultural research laboratory work could be a start from which a considerable number of products could be developed.

I have had first hand contact with enterprises for making monosodium glutamate, and other amino acids, starches, and dextrins, ethyl alcohol, and animal-feed supplements from wheat in the United States and abroad; the limitations for further development are primarily lack of information.

In my present position, fermentation processes offer an attractive future for processing crops. Lactic, citric, acetic, and other organic acids have potentials, as do new organic compounds which can be made from the starch fraction. Polymers similar to dextran, antibiotics, and pharmaceuticals such as steroids, amino acids, vitamins, enzymes and coenzymes, as well as other drugs are potentials. Only research will bring these potentials to light allowing adequate evaluation to be made of them. Only by using the facilities of industry,

educational institutions, and governmental laboratories can the essential really comprehensive investigation be made, and this program must be comprehensive to be effective. We know the fine work as has been pointed out here that has gone along and has been put on the shelf and never carried to fruition. If we are going to do anything our legislation here should set up a program, a means of a comprehensive program that will bring results.

Fundamental research, applied research, engineering, plant design, market research, all of this can be done by collaboration of those units best prepared to handle specific problems.

My employer is willing to participate in such a program. And, we believe we can do so by supplementing our present staff of scientists with people capable of doing good work under the supervision and guidance of our present staff. We would not be pirating scientists needed in other critical fields. These additional employees of technician grade, additional equipment and materials would make possible the kind of research needed to carry out a program recommended by the Commission on Increased Industrial Use of Agricultural Products. It is my opinion governmental laboratories could also do this.

The colleges would surely welcome real problems on which students might work, especially if financial assistance is offered. With assistance, colleges can undoubtedly increase the number of postgraduate students they can accommodate. With an increased number of students doing research on problems vital to our economy certainly we will be training more scientists and giving them an insight into a field that is most productive and interesting, and offers future opportunities for them. Their theses and reports will have value and may even help these students to find their place in industry readily.

Once the research and development work has been completed a potentially new industry requires a sizable investment of capital. In order to establish an economical operating unit some aid may be necessary. The plant must be erected, an operating crew trained, and the necessary experimental work done to get the men, machinery, and materials performing in harmony to get desired results. I am not sure what the nature of aid needed to get through this stage may be, but help could take the form of outright financial aid, loans, tax considerations, et cetera.

Certainly, once an operating unit is running economically it will be an inspiration and have considerable value for developing future operations. The nature of that aid, of course, would be worked out with the people who administer the program. An example of a development going through this stage was the batter process for processing wheat. We took this information from the Department of Agriculture laboratories at Peoria, took it through to the final stage as Mr. Levitt described and put up an operating unit.

When we had that unit operating it was of such interest that scientists and engineers came from Canada, Australia, Europe, and of course the United States, came to view it. As a result, other operations of this nature are in existence in these countries today.

Our vast synthetic chemical industry has developed because of the millions of dollars invested in research. If agricultural industries are to be established adequate funds for research in the promising areas must somehow be provided. A program could be launched with a

relatively modest appropriation; $50 million should suffice to make a start on some of the more promising projects awaiting investigation. As these projects progress more funds could be well placed so other projects might follow. The Commission has pointed out 106 fields that offer promise for investigation and from these fields many projects should prove fruitful. As progress is made, the program would unquestionably justify increasing appropriations, as has been experienced in other industries. A comprehensive program would without any doubt be instrumental in developing new industries having new uses for our old and new crops and which would produce new products and new jobs for our increasing population.

That about completes my testimony. It has been an opportunity to have a chance to say this.

The CHAIRMAN. Thank you, sir.

Senator AIKEN. I have one question. Dr. Faucett, does your company retire its research employees at 65?

Mr. FAUCETT. That is optional. We now have several members of our organization who are well past 65 and are still going strong.

Senator AIKEN. I was wondering if on the whole we were not making a mistake by retiring a lot of people about the time they get to the point of greatest usefulness, having made all the mistakes that could be made themselves up to that point. They should be able to do a few things right.

Mr. FAUCETT. They have a wealth of information, No. 1; they have mature judgment, No. 2; and No. 3, if you can free those people up with younger people to do the legwork, I think it is the best thing that we have in our organization.

Senator AIKEN. I have thought a good deal about it.

The CHAIRMAN. Thank you, Dr. Faucett.

Is Mr. Newsom present?

Mr. C. M. JACKSON, National Grange. Mr. Chairman, Mr. Newsom couldn't come at the last minute. I brought a statement that I will be glad to summarize or file.

The CHAIRMAN. The statement will be filed for the record.

(The document referred to is as follows:)

STATEMENT FILED BY HERSCHEL D. NEWSOM, MASTER, NATIONAL GRANGE

This opportunity to make a few general statements regarding the Grange's interest in industrial utilization agricultural products and to discuss some of the opportunities and problems involved, is much appreciated. As we all know, Congress and the country are now vitally concerned over what is commonly referred to as The Farm Problem. This has been true for the past quarter of a century, but the compulsion for an intelligent approach to this problem has never been greater than it is today.

We have just passed through one of the greatest periods of prosperity ever experienced by any country of the world. Yet, throughout this period—in spite of billions spent to encourage agricultural prosperity—we have seen the disparity between farm and nonfarm income continue to increase.

Why should this be true? Why should we—in a country as great as ours—be forced to admit that we have failed in our efforts to provide equitable income opportunities to agriculture, the greatest single segment of our economy—in number of people involved and in terms of total investment?

It is true largely because we have failed to provide agriculture adequate opportunities to use many of the economic and scientific tools employed so successfully in other segments of our economy.

For more than 25 years we have been trying to apply the basic philosophy of "guaranteed prices and production controls" in our efforts to bring prosperity to agriculture. The results of these efforts are well known.

Clearly, it is time then that we turn boldly to new approaches. It is time that we start providing agriculture an adequate opportunity to use both the economic and scientific techniques others have employed in bringing prosperity to their segments of our economy. That is why we are highly pleased with the fact that Congress is now considering commodity legislation which would, if enacted, help put an end to Government destruction of both private trade in agricultural products, and farmer control over production patterns in farming itself.

Records clearly show that industrial research—research that has brought new products into existence and improved the quality of others—has prevented the passing of many of our established American industries. Research has also brought many new industries into existence.

We, therefore, want to commend members of this committee and others who have taken the initiative in efforts to provide for an adequate program of research designed to develop new industrial uses for agricultural products.

The Grange is keenly interested in the legislation involving individual farm commodity programs, which is now before Congress. We consider bills by Senator Curtis and others, developed to include recommendations of the Commission on Increased Use of Agricultural Products, as more far reaching and perhaps even more important in terms of longtime effect, than any other pending farm legislation. We feel that research which would be provided through this legislation is absolutely essential to the solution of many of our farm commodity problems, and therefore, essential to the success of other legislation under consideration.

It was this feeling which prompted delegates to the 91st annual session of the National Grange to—after many hours of study and deliberation—approve a resolution reading in part as follows: "We urge congressional authorization of a new and concentrated program of research as recommended by the Commission on Increased Industrial Uses of Agricultural Products. We wish to commend the members and staff of this Commission. Their study and report has already stimulated thought and boldness in agricultural circles. If converted to action, the Commission's recommendations could conceivably produce for farmers a chain of benefits even beyond our present ability to estimate. We believe that appropriations for this program should be commensurate with the scope and urgency of the task. We support the bipartisan proposals advanced in Congress and the principle of the Commission's recommendation that the program be financed at least in part from gross annual customs receipts. Our emphasis here on new research in the agricultural industrial field does not indicate any slackening of interest in other areas of research."

Now what are some of the conditions which have resulted in our present concern over the need for a research program as outlined in the recommendations of the Commission and as provided in the bills now before this committee? Actually, these conditions are rather thoroughly covered in the very comprehensive report submitted by the Commission. But, at the risk of touching on points with which members of this committee are thoroughly familiar, I want to briefly review the progress industry has already made in this field.

It is a matter of record that industry spends about $3 billion annually—or about 3 percent of its gross sales—on research. Many industries in the newer and faster growing fields, such as chemicals and electronics, are reinvesting as high as 7 percent of their gross income to research.

In his remarks recently, the president of a well-established American business institution illustrated the wisdom of such investments with the following statement—"Of our total sales volume last year, approximately 45 percent came from items not even on our pricelist 5 years ago; and 72 percent represented sales of products not in the pricelist 10 years ago—and so, we spend money to support our ever-increasing research on the development of new products with confidence."

It is often said that certain agricultural commodities have been "priced out of the market." It would be far more correct to say that in many cases these products of the farm have been "researched out of the market."

It is true, for example, that under present conditions it is becoming increasingly difficult for many of our natural fibers to compete pricewise with synthetics, such as rayon, nylon, and Dacron, but let's not lose sight of the fact that all these synthetic fibers are the result of industrial research. Even though synthetics have seriously interfered with our market for the natural fibers, we must recognize the fact that they have contributed to our national economy. They represent progress.

Records also show that about 2 out of every 3 pairs of shoes manufactured today are made partially or wholly of leather substitutes. As late as 1950, we were importing cattle hides to meet our domestic need for leather, but by 1955 we had a

surplus of leather. Actually, the price of hides was decreasing during much of that period. So, leather wasn't priced out of the market. It was, to a large degree, replaced by new products of industry.

We are all familiar with the manner in which the synthetic detergents have replaced soaps made from animal fats. Today only about 25 percent of our inedible tallow and grease is used in making soap whereas a decade ago about 80 percent of these products were used by the soap industry. So, again the products of industrial research have largely taken over a long-established market for one of the important products of livestock farming.

Some of us, in reviewing these technological developments affecting agricultural markets, may be prone to think only of their adverse effect on our established system of operation. We must, however, remember that the overall effects of these developments have, in many cases, been good for our general economy. In such cases, they will continue to develop regardless of the immediate effect upon the market for agricultural products.

As a matter of fact, much of our industrial research has been good for agriculture as well as for our national economy.

Take the situation as it applies to inedible animal fats and oils, for example. As pointed out a minute ago, the synthetic detergents have already largely replaced the use of fats in the soap industry. But, while this market was disappearing, other results of industrial research were developing a completely new market for the inedible fats. Scientists had developed satisfactory means of feeding the fats back to animals themselves. As a result, the feed manufacturing industry is today providing a market for at least 400 million pounds of animal fats annually—a market that was totally nonexistent just a few years ago and one that is expanding rapidly today.

We also hear charges that industrial research is responsible for our present surplus farm commodities—that is, that we would have no surplus were it not for newly developed fertilizers, insecticides, production and harvesting equipment, and so on.

Well, research has increased production and efficiency—but far more important is the fact that these products of research (mostly industrial) have enabled us to meet the ever-increasing food needs of this country and do it at less cost than would have otherwise been the rule.

It has been reliably estimated the research has reduced the Nation's food bill by about $1 billion annually during recent years.

And, right here I would like to make a point regarding production research. It is often charged that we have overemphasized production in our research efforts. It is true that we have not maintained anything like a proper balance between production and marketing or utilization research in agriculture, but it is far more correct to say that we have underemphasized marketing and utilization than to say that we have overemphasized production.

Relatively speaking we have never had a large surplus of any agricultural commodity. It is true, of course, that we have the knowledge and facilities for increasing our current production, but basically this productive capacity is a national asset and not a liability.

Let's not forget that this great American food production plant proved to be one of the world's greatest assets during World War II.

Also, as late as the early fifties—during Korea—America's efficiency in food production again proved to be one of the decisive weapons in our fight to preserve democracy. During this period, production over and above our current market needs was referred to as "A Safe Reserve" and not a surplus. This was less than 10 years ago—and we should not forget it.

Today, the entire free world is concerned over the Soviet Union's recent progress in the field of science—sputniks, space exploration, nuclear physics and other scientific developments which if supported by an efficient food production program could well lead to world domination. It is generally agreed that the Russians are ahead of America insofar as many of these developments are concerned, but not even the Soviets themselves question America's superiority in the field of food production.

Therefore, it could well be that this tremendously efficient food production plant of ours is the one great roadblock confronting the present Communist drive for world domination.

So, let's make no apology for the work we have done in the field of agricultural production research. Instead, let's vigorously seek new methods of using the products of our farms to strengthen both our agricultural and general economy—while supporting our national security.

One thing we must remember about industrial research is that one of its major objectives is increased profits. Therefore, industry does relatively little "basic research" and it does practically none in the field of agriculture. Very largely, the job of the industrial research worker is to take basic knowledge developed by others and to convert it into useful products—products that will return additional profit to his industry. Basic research offers little profit incentive. Therefore, it is extremely important that we vigorously pursue a course that will provide research workers of industry with the basic scientific information needed to fully develop the potential value of agricultural products. This calls for a strong program of basic or fundamental research, which must, to a large degree, at least, be initiated by public institutions and financed by public funds.

Now, how does our agricultural research program compare with that of industry? What have we done toward exploring the possibilities of new industrial uses for agricultural products—or toward developing new crops that can be grown in the place of those in surplus supply?

Actually, we have done quite a bit, but as compared to industry we have merely scratched the surface. Where industry is spending $3 billion annually on research, agriculture is spending $375 million. Where industry is plowing 3 percent of its sales back into research, we are using about 1 percent. Furthermore, of the $375 million total spent for agricultural research, only about $18 million goes for utilization research—and that amounts to about five one-hundredths of 1 percent of our total agricultural income. (Think of that—five one-hundreds of 1 percent of our sales for utilization research.)

In 1938, Congress authorized the establishment of four regional utilization research laboratories, but immediately after these were established it became necessary that their efforts be directed to food production problems resulting from World War II—and later to those brought on by the Korean war. Therefore, for nearly half of their 16-year existence, these laboratories, in spite of the purpose for which they were established, have been obliged to divert their primary efforts from utilization research to other work made necessary by war and national defense.

Furthermore, because of rapidly increasing costs, the number of scientists hired and the amount of equipment bought has been far less than was anticipated when appropriations for the institutions were made.

But, in spite of these handicaps, the Commission's study shows that these utilization laboratories had worked out over 125 processes which were in commercial use at the time the study was completed over a year ago. I believe that we will all agree with that section of the Commission's report which states that had these regional utilization laboratories done nothing more than perfect the practical method of producing penicillin quickly on a large scale, or no more than to have played an essential part in establishing the frozen concentrated fruit juice industry, their costs would have been justified. But, other products and processes have been developed.

For example, cotton has presented one of our most serious surplus problems. Synthetics developed by industrial research have taken over a large share of the market for cotton. But, the regional utilization research laboratories have already helped place cotton in a more favorable competitive position. They too have tackled the job of improving the market at the buyer's end. They have discovered chemical treatments that give cotton awnings greater resistance to rot—that make cotton rainwear, tents and tarpaulins water resistant—that give two-way stretch to cotton bandages—and that make cotton drapes, upholstery fabrics and work clothes flame resistant. Their work has given us new "wash-and-wear" cotton garments that are crease-holding and wrinkle resistant.

All this, however, is merely an illustration of results we may reasonably expect from a full-fledged program of utilization research such as would be provided through the legislation under consideration. Even today, in spite of our limited efforts in this field, industry is providing a market for about $4 billion worth of agricultural commodities annually, but this represents only about 4 percent of our total production.

Now turning to the report of the Commission on Increased Industrial Use of Agricultural Products and to the legislation before this committee, you are all familiar with the committee's report and recommendations. You know that the Commission itself was made up of some of the Nation's best known and most learned citizens. A list of members of the Commission, its staff and consultants reads like a directory of "who is who" in science and agriculture. The Commission made a long and exhaustive study of the problem it was asked to explore. It came up with a complete report and a comprehensive set of recommendations—recommendations which have been highly acclaimed by leaders in Government,

agriculture, business and science. I doubt that the report of any official body has ever created more interest and bold thinking—or less controversy.

The key conclusion reached by the Commission was that—the American economy can develop profitable industrial markets capable of absorbing enough of the excess farm production to minimize, or perhaps even completely eliminate the need for our present costly Government programs involving restricted production, price supports and surplus-disposal operations.

The Commission lists four basic problems to be overcome in making such a program possible.

The first of these is a lack of general understanding and appreciation of the importance, the possibilities and the urgency of the industrial utilization approach to the farm surplus problems.

The second is the need for a greatly expanded program of both fundamental and applied research.

A third problem is the shortage of scientific talent—that is, personnel with the scientific training required.

And a fourth is the need for providing suitable incentives for those who risk their labor and capital in the pioneering stages of the commercial utilization of certain commodities. But as the Commission points out, the initial step in launching such a program is sound legislative action by Congress.

So, regardless of all other problems involved and regardless of all opportunities promised, members of this committee, by approving legislation encompassing the basic recommendations of the Commission on Increased Industrial Use of Agricultural Products, have an opportunity to take the initial step. And, we urge that action.

However, in closing, I want to repeat one warning voiced by members of the Commission—there is no panacea which will provide a quick and magical solution to our problem. The type of research we are talking about cannot be done overnight. Time will be required to properly plan and organize the program. Some of the talent needed is yet to be trained, and much of the research equipment is yet to be developed. And, research itself—especially fundamental research—is slow.

Laboratories and research equipment are expensive and they must be purchased and installed before the research is even started.

So, we should approach the program with a full determination to provide both the funds and time necessary before expecting results. We must realize that we are launching into a bold venture. We believe, however, that investments required are wise, and that they represent an essential part of a sound legislative farm program.

The CHAIRMAN. Mr. Berck.

Senator CURTIS. Mr. Chairman, I would like, in a second, to say that Mr. Berck is one of our distinguished citizens from Nebraska. He heads an important farm organization, the Nebraska Farmers Union. I believe he will tell us he is authorized to speak for his national organization, and I recommend his testimony to the committee.

The CHAIRMAN. All right, Mr. Berck. I see you have quite a lengthy statment. I wonder if you would be good enough to highlight it for us on the condition that the whole statement will be placed in the record.

STATEMENT OF ELTON BERCK, PRESIDENT, NEBRASKA FARMERS UNION, OMAHA, NEBR., ALSO REPRESENTING THE NATIONAL FARMERS UNION

Mr. BERCK: I will be very happy to, Mr. Chairman.

(The prepared statement is as follows:)

Mr. Chairman and members of the committee, we appreciate the opportunity to appear before this committee and present our views concerning the expanded industrial use of farm commodities and further research in this direction.

The program committee of National Farmers Union, on which I served, and the delegates to the national convention supported legislation to expand the consumption and use of farm products. They wrote into the program of National Farmers Union the following:

"All areas of expanding demand for farm commodities, consistent with good soil-conservation practice, should be explored exhaustively before we concern ourselves with production restrictions; our first concern is that no person lacks the food needed for adequate nutrition. * * *

"Additional emphasis should be given to Federal programs to promote greater industrial use of farm commodities not needed for food at prices consistent with full parity incomes for farmers. We urge adoption of an immediate and adequate program for continuing research aimed at expanded practical industrial and other new uses of agricultural products. We further recommend reactivation and pilot experimental operation of presently owned Government facilities, including grain alcohol and synthetic rubber plants. Satisfying the true need of this Nation's citizens for farm commodities is a truly national program not one to be accomplished at the expense of farm family income."

The legislative committee of Nebraska Farmers Union and delegates to our State convention fully support expanded industrial use of farm commodities as indicated by the following:

"We * * * recommend that secondary uses such as grain for fuel alcohol be put into operation at once so that full agricultural production can continue to furnish America the high standard of living and security in plenty to which our people are accustomed and still hold reserve stocks to manageable quantities * * *.

"We reject the oft-repeated falsehood that lower prices for major farm crops will limit production. The pressure on farmers to produce and sell in order to get dollars can cause increased production in the face of falling prices. Therefore for the economic welfare of America as a whole, we recommend that a storage and loan program be continued at a relatively high level. * * *

"We endorse the objectives of 100 percent of parity for agriculture as the only honorable or fair basis for action concerning agriculture."

Farm families in the United States have the capacity to produce more farm products that can be marketed at prices which reflect incomes comparable to those of other segments of the economy and necessary to maintain an agriculture in which families own and operate individual farm units.

Farm families can work to solve their income problems basically in two general directions: They can work for and support programs to give them greater bargaining power and thereby exercise more control over the price of their commodities at the farm gate; they can support programs which increase human consumption and industrial utilization of their produce. The proper approach to the problems of agriculture does not lie in any one of those two general directions. Instead, farmers' interests are best served by programs both to give them greater control over prices at the farm gate and to expand consumption and utilization so more of what they produce can be sold.

On the side of expanding human consumption we have made some progress. I refer, specifically, to the Federal school-lunch and milk programs and the direct distribution of farm commodities in CCC hands. Even on the side of expanding consumption, however, there is much to be desired as is illustrated by the bills introduced to authorize use of section 32 funds in food distribution, and by the efforts in both the Senate and House to expand the hot school-lunch program now reaching only about one-third of elementary- and high-school pupils.

The other side of expanding consumption is the industrial utilization of farm commodities made possible by research. In this connection, Mr. Chairman, I shall devote most of the remainder of my comments to the application of research. The immediate interest of farmers is vested in the realistic and practical application of research—not in publishing findings for library shelves. Sponsors of bills such as S. 2306, S. 724, S. 3215, S. 581, and S. 2952 obviously share with us this point since provision is made in each of the bills for the application of research findings as well as expanded research in the longer range effort to find additional industrial uses for farm commodities.

We all can agree on the long-range advantage of research as is provided for in Senator Curtis' bill, S. 2306, and in other such bills before the committee. However, it is the immediate application of research in which the interest of farm families is vested. Several bills before the committee provide for the operation of Government-owned facilities to produce grain alcohol and butadiene. This use of grain has developed out of research and, in addition, much experience was gained during World War II when nearly all synthetic rubber was made from the cereal grains.

Only small amounts of grain are used currently for making industrial alcohol. Synthetic alcohol made from petroleum is used exclusively today for the manufacture of synthetic rubber and, while we hear encouraging reports from researchers concerning the use of grain alcohol in motor fuels, we have so far made no progress

in this direction—not even for use in tractor fuel excepting successful experimentation of such use.

We feel that we ought to be making use of our surplus grain in industrial processes of all kinds as the techniques are developed through research. But we feel strongly that the processes for using cereal grain which are known and with which we have had experience should not be wasted and existing facilities allowed to stand idle.

A common explanation for use of petroleum as a source of alcohol is that it is less expensive, but I submit that the findings of the Commission on Increased Industrial Use of Agricultural Products indicate "a wide disparity in estimates as to the costs of alcohol made from grain." Moreover, there was difference of opinion among sources of information as to the prospects for utilization of grain in various end products in which grain alcohol may be used. We can only conclude, along with the Commission, that industrial use of grain, and alcohol made from it, needs further examination. The operation of our grain alcohol and butadiene facilities would lend some additional urgency to research and we all expect such findings to reduce further the cost of making alcohol from grain.

Evaluation of opposition to operation of Government-owned grain-alcohol facilities, if objective, will show one important factor which must not be overlooked: the cereal grains are a renewable resource while petroleum is an exhaustible resource. Cost, therefore, in our judgment is not as important a consideration as the opposition holds it to be.

It is both logical and practical to weight the factor of cost so that it does not become, in and of itself, the basis of decision and action on the bills before the committee which authorize operation of existing idle grain-alcohol and butadiene facilities.

In the actual operation of our now idle facilities, experience and practice combined with research findings since these facilities were in use are certain to result in cutting costs of producing alcohol from grain. We are just beginning to learn, for example, how to remove protein from grain before the fermentation process. If an inexpensive commercial process is developed and uses can be found here and abroad for the protein as food, or as an ingredient of food, the use of the protein would result in a higher total value of grain that is converted to industrial alcohol. There is also the possibility of finding higher use for distilled dried grains through research.

POTENTIAL USE OF INDUSTRIAL ALCOHOL

Alcohol is the most versatile of all chemical compounds. It is, in its various forms, a fuel, a solvent, a germicide, an antifreeze, a plastic, and because it has the chemical composition necessary for the manufacture of butadiene, it is rubber. Uses of grain alcohol in these and other areas are under study and there is a possibility of potential breakthrough into new uses, expanding substantially the demand for alcohol in industry. Also, the task group reporting on industrial alcohol made from grain expressed the view that potential uses were favorable in those industries that now are or soon will be expanding to meet new market demands. We should recognize that grain alcohol will be passed over in the breakthrough into new uses and in the expansion of current uses unless there is a supply available at the time it is needed. To have the supply available to meet new and expanding current use, we urge favorable action on legislation similar to S. 581 introduced by Senators Hruska and Curtis.

Government facilities for the conversion of grain alcohol into butadiene exist but are not is use. Based on the findings of the Commission on Increased Industrial Use of Agricultural Products, there is justification for the operation of these facilities. The advantages cited by the Commission are as follows:

"Utilization of an existing potential, which may be found to grow, for the disposal of surplus grains in a manner less uneconomic than some of the current disposal methods. * * *

"Lessening of the current market pressure from daily sales of lower grade grains * * *

"Conversion of a substantial quantity of Government-owned lower grade grains into useful commodities.

"Satisfactory opportunities to determine definitely the costs which are involved. * * *

"* * * and prospective utilization of annually renewable natural resources rather than depletion of an exhaustible."

The potential capacity of existing idle industrial alcohol plants is about 250 million gallons of 190 proof alcohol per year. Production of this quantity of alcohol would consume approximately 100 million bushels of grain annually.

The Department of Agriculture estimates the 1958 corn crop at 3.2 billion bushels. With expected domestic uses of corn approaching 3.1 billion bushels for 1958–59 marketing year, full-scale operation of existing alcohol producing facilities would balance production with consumption.

BUTADIENE

The Federal Government owns a plant at Louisville, Ky., in which butadiene can be produced from grain alcohol. A second plant at Kobuta, Pa., was sold by the Government in 1955 but with provision for maintaining the facilities for producing butadiene through 1965. Under steady production, and with expected improvement in operation, as much as 229 million gallons of alcohol could be utilized approximately equivalent to the productive capacity of now idle alcohol-producing facilities.

Use of butadiene, from which synthetic rubber is made, is expanding. Such use is expected to forge ahead of natural rubber in the next few years. A survey of the Department of Commerce shows that the market for synthetic rubber will double by 1975. Additional plant capacity for the production of butadiene will be needed. Already, manufacturers of petroleum-derived butadiene are anticipating this expanded use of synthetic rubber. There is some current expansion of such plants and more can be expected if the Congress fails to take the necessary action to allocate a portion of the market for synthetic rubber to the producers of grain and grain alcohol.

According to the Department of Agriculture, farmers use approximately 320 million pounds of rubber each year in tires, tubes, recaps, and other uses. If they were in full-scale operation, the Louisville and Kobuta butadiene plants would produce 392 million pounds of butadiene annually. Farmers themselves, therefore, consume rubber in amounts almost equal to the capacity of these two Government-owned butadiene plants.

ALCOHOL AS A MOTOR FUEL

Alcohol-gasoline blends of 10 to 25 percent can be used in engines of current model automobiles and tractors, with full performance. Many foreign countries require by law a blend of grain alcohol and mineral fuels. It is reasonable and realistic for the producers and consumers of motor fuel in the United States to accept such a blend if it can be accomplished in ways which will not increase the cost to the consumer.

The Commission on Increasing Industrial Use of Agricultural Products has recognized "the appeal which the motor-fuel approach has as a method of eliminating surpluses." For example, a 10 percent blend of alcohol with gasoline would result in utilizing 2 billion bushels of cereal grain annually.

As an immediate approach to the utilization of grain alcohol in motor fuel, we recommend a pilot program using idle facilities at Omaha, Nebr., to make grain alcohol from offgrade grain for use in tractor fuel. We urge expanding production at other facilities and adding grain alcohol to additional tractor and automotive fuels as possible under production schedules developed by the agency charged with the responsibility.

According to census reports, farmers use for all purposes about 6 billion gallons of gasoline annually. The capacity of the idle Omaha plant is 30 million gallons annually. Using a 10-percent blend of grain alcohol, only 300 million gallons of gasoline could be blended with the production of the Omaha plant, or 5 percent of the gasoline consumed by farmers. There is a potential use of 600 million gallons of grain alcohol in farm-consumed gasoline, assuming a blend of 10 percent.

Productive capacity of now idle grain-alcohol facilities would produce only about 40 percent of the grain alcohol required to make a 10-percent blend of gasoline consumed by farmers.

The potential use of our abundant cereal grains in motor fuel and in the manufacture of synthetic rubber ought not to be overlooked by Congress. We are in a much different position today than in the fall of 1945 when we closed down the grain alcohol butadiene plants and permitted the producers of synthetic alcohol to supply all of the alcohol requirements for synthetic rubber. We are in a different set of circumstances than those prevalent when we ceased to operate Government grain-alcohol plants such as the plant at Omaha, Nebr. We are on the threshold of new discoveries in the field of research which will enlarge the demand for the cereal grains if we have the necessary facilities for converting them into chemical compounds needed by industry. Research findings, for example, show (1) grain alcohol-water injection is feasible in engines and that the octane rating of gasoline

is increased by blending with alcohol or by using an alcohol-water injection; (2) many new uses for dialdehyde starch and an inexpensive means of producing it; (3) a new variety of corn containing a different kind of starch rich in a material called amylose which has use in cellophanelike film, lacquerlike coatings and in the manufacture of fibers resembling acetate-rayon; (4) prospects of the plastics industry using greater quantities of ethylene are good.

The actual and potential progress in research, the pressing need for expanded use of grain, new and expanding uses of industrial alcohol in the various forms, and justification of weighting the factor of cost to reflect the use of renewable agricultural resources are all considerations which contribute to the need and justification for using the idle facilities that we have for the utilization of agricultural commodities.

We believe that the industrial use of agricultural commodities, while advantageous to family farmers, is not a substitute for adequate farm income protection and price support programs. Industrial use is not the complete answer to the need for additional protection to farm prices and income. Also, when a conflict in aims occurs, we feel that adequate human nutrition and clothing should be given higher priority than nonfood and other uses which do not contribute directly to these essentials. In this connection, Mr. Chairman, some of the bills before the committee provide for Agricultural Research and Industrial Boards. The provisions of the bills differ in the procedure to follow in setting up such boards. We do not intend to inject still another procedure. However, we feel that adequate representation from among farmers themselves should be provided for in any bill you approve which contains such a provision.

Time is an important element in research. Even the most patient of us would like to run the clock ahead in an effort to speed up the findings which we can foresee in the months and years ahead. We urge that you continue to take whatever action is needed to make possible research into the fields that offer the greatest hope for expanding on the industrial use of farm commodities. We assure you, however, that we are cognizant of the time element in the operation of our research programs and facilities. The most we can ask is that the administrators of these programs and facilities do their best to get the results of their work into practical application at the earliest possible time.

Mr. BERCK. It is my privilege to represent the National Farmers Union and Nebraska, as Senator Curtis said. Not only do we appreciate the opportunity to appear before the committee, but I would like to express personally my appreciation for having been permitted to sit in on the testimony that has taken place thus far today.

It has been very illuminating and interesting. You have heard from science, you have heard from industry. This is a brief presentation from the producer angle.

We represent a segment of people who are producers of the products which we are concerned with today.

The statement goes on to outline our interest, which has been expressed in programs as adopted by delegates at both National and State levels, and it goes on to express an interest in programs for expanding demand for farm commodities along all lines, not only increased domestic consumption, consumption for food and fiber purposes, but industrial utilization.

In Nebraska, we have been particularly interested because, as you know, Mr. Welsh who headed the Welsh Commission, comes from Omaha, and we of the Farmers Union do appreciate the tremendous job that was done by that committee. I would like to say this further: That farm people as a whole feel an urgency about this thing which doesn't seem to be reflected in some of the attitudes of either business or industry.

Repeatedly across our desk comes a comment—well, briefly here is a statement which comes to us from a district meeting of Farmers Union in Nebraska:

Whereas there is a surplus of grain in this area, be it resolved that we favor the reopening of the alcohol plant in Omaha.

Now that comes to us repeatedly, and farm people, the producers, feel that there is an urgency about this thing. Not that industrial utilization is the total answer, mind you, but it is a part of the picture which has been neglected.

It has been moving along far too slowly. We have been losing that type of market, and we do favor specifically 2306, and like legislation which is proposed for industrial utilization.

We are interested in a realistic and practical application of research, not in publishing findings for library shelves.

That is why, Senator, we are interested in your bill and bills like it. These findings have been made public. If they are allowed to accumulate dust on shelves, if they are not put into practical usage, and it is a matter of urgency—other experts mentioned a crash program. Well, when we think of a crash program, we think of something which might do the impractical, because of an urgency.

Well, it isn't that type of a crash program we are thinking about, but we do think of it as a very urgent need, this increased industrial research and industrial utilization and a practical usable basis, economically practical.

We feel that Mr. Welsh and his commission in their statement at the very outset and their summary, when they outlined their thinking that increased industrial utilization can be in large part an answer for what we call the farm problem, we would agree with that.

So, from the producers standpoint, we think that these bills, the principle, the philosophy behind these bills, need to be put into practical operation.

We have heard a good deal about the cost, the cost factors in the production of alcohol and so on, but it is both logical and practical, as we say here, to weight the factor of cost so that it does not become an end in itself.

That is all the factors involved need to be considered. That is why we call for the operation of pilot plants exploring, trying to get the answers to some of these things.

We notice in the Welsh commission report and in other reports that different producers, different industrial outfits, differ widely in varying statements as to the cost of producing grain alcohol and what they pay for grain.

Since there is confusion along that line, certainly a practical operation on a pilot basis is called for so we do get some known answers.

We in Nebraska have been particularly worried and perturbed about the repeated propositions to sell the plant, the Omaha plant. Our feeling is this:

That when these plants now owned by Government, which can be used in pilot operations, when these plants are sold, we get that step farther away from the operation of this type of a program.

We have felt that those pilot plants should be kept in ownership, in the ownership of Government until such time as Congress makes available this type of a program to use them in a pilot operation.

Gentlemen, we favor the passage of this legislation and we hope that the committee turns a favorable report in on this and related bills.

If there are any questions, I will be very happy to try to answer them.

The CHAIRMAN. Thank you, Mr. Berck. We are glad to have had you, sir.

Mr. STODDARD.

STATEMENT OF CHARLES H. STODDARD, TECHNICAL FORESTRY CONSULTANT FOR THE DOUGLAS COUNTY, WIS., INDUSTRIAL DEVELOPMENT COMMITTEE

Mr. STODDARD. I will try to summarize this very briefly. I appreciate the opportunity to do so.

(Mr. Stoddard's prepared statement is as follows:)

My name is Charles H. Stoddard and I am representing the industrial development committee of the Douglas County, Wis., Board of Supervisors as their technical forestry consultant. Douglas County, located at the head of Lake Superior and embracing the city of Superior includes large areas of second growth hardwoods ideal for newsprint production under recently developed papermaking processes. We have not only the timber, but vast quantities of fresh water in Lake Superior, low-cost water transportation as well as good rail connections, a highly skilled labor supply and low-cost sources of petroleum and coal fuels, an ideal and economic newsprint mill location.

In the few minutes I have available I should like to speak in favor of S. 3697, and companion bills, on increased use of agricultural and forest products for industrial purposes because it includes the features which our Senator Proxmire had in mind when he introduced a pilot-plant newsprint bill earlier in this session of the Congress. There are six main points which I would like to present for the committee's consideration.

1. TIMBER SUPPLIES

The recent Timber Resources Review of the United States Forest Service has made it abundantly clear that while we face a near shortage of higher quality conifers and hardwoods, there is a substantial surplus of lower grade hardwoods over most of the eastern United States. In Wisconsin alone we have an annual growth of 296 million cubic feet of hardwoods and are currently utilizing only 130 million—less than half.[1] Located near many small rural communities this great resource can supply the raw material for much new industry. Utilization under proper cutting practices will not only provide much woods employment but will stimulate tree growth in the woods and result in better future stands. Independent timber farmers who harvest pulpwood for a living are seriously in need of widened markets for lower grades of timber.

2. TECHNICAL FEASIBILITY

Recent developments in paper chemistry have demonstrated clearly that low grade hardwoods can be efficiently utilized by the cold soda and semichemical processes of pulp manufacture, and converted into printing papers of many qualities. The Commission on Increased Use of Agricultural Products included a task force with a membership of J. Alfred Hall, director of the United States Forest Products Laboratory, Paul M. Dunn of the St. Regis Paper Co. and other prominent scientists and industrialists. In their statement they said "Further use of hardwoods is being made possible by the cold soda process of pulping which is in the advanced experimental stage. * * * This development requires a continuous pilot plant study to extend the usefulness of the cold soda process, and laboratory and engineering research aimed at increasing the efficiency and lowering capital requirements for this new approach. * * *"

In 1954 the Department of Commerce in cooperation with the Department of Agriculture submitted to the Committee on the Judiciary of the House of Representatives a report entitled "Newsprint From Hardwoods" in which the cold soda process has been set forth as a completely sound method for newsprint production.

In the March issue of the Pulp and Paper Journal (industry periodical) Prof. R. A. Diehm of Western Michigan University stated at a technical conference on pulping that "more cold soda will be made * * * high yield processes will be improved."

The evidence is clear that the cold soda process is technically feasible for the manufacture of newsprint and that improvements can be developed by additional research carried on at a commercial scale. The Douglas County Industrial Development Committee strongly urges that the provisions included in Senator Proxmire's pilot plant newsprint bill be included in your committee recommen-

[1] From the Timber Resources for America's Future, U. S. Forest Service, 1958.

dations and that in particular, inclusion of research on a scale adequate to the needs be carried on in conjunction with the establishment of newsprint mills which may be forthcoming.

3. ECONOMIC FEASIBILITY

Only a limited amount of cost information is available on the cold soda process but a paper reported at the second annual pulp and paper conference at Kalamazoo, Mich., given by Prof. R. A. Diehm indicated that cold soda pulp could be produced at a cost of about $60 per ton. This was based on experimental studies already underway. Add to this pulpmaking cost about $40 per ton for finishing it into newsprint and the total manufacturing cost amounts to $100 per ton. That this figure is clearly within the limits of economic operation is indicated by the selling price of newsprint at over $130 per ton. These costs include direct operating costs, raw materials and overhead.

The same paper (Exhibit A) also estimated the capital construction costs for building a mill to produce 100 tons per working day. The cost per ton for the construction of a mill to produce semibleached cold soda were estimated at $34,000 plus working capital of $16,000. Thus the construction and capital needed for financing operations amounted to a total of $50,000 per ton, or a total of $5 million for a plant producing 100 tons per day for 200 working days per year. To these costs would be added investment needed for finishing the paper, running to several more million depending upon the type and quality of paper to be produced.

These figures clearly show that the costs of establishing a number of paper mills to produce newsprint and other volume papers are relatively low when compared with the traditional sulfite, sulfate and other chemical processes. Furthermore, waste disposal and pollution problems are nearly nonexistent because it is economical to recover the spent chemicals from the waste paper mill liquor.

Clearly then the financing of construction of a number of cold soda newsprint mills is well within the realm of possibility of a large number of communities needing new industry. With the kind of assistance provided for in this bill by the Federal Government a real incentive will be developed for the establishment of a number of locally owned and controlled papermills which can continue to assure the free press of the United States with adequate supplies of paper.

4. FUTURE DEMAND AND MARKETS

Ever since World War II the press of this country has been subjected to serious shortages of newsprint and a price spiral considerably in excess of the general rise in commodity prices. The extent of these price rises is shown in the following table:

Relation of rise in newsprint prices to all wholesale commodities[1]

Year	Price per ton	1945 price	All wholesale commodities	Increase in newsprint over wholesale prices
		Percent		
1945	$60.25	100	100	0
1949	100.00	168	138	+30
1952	120.25	200	154	+36
1954	125.50	208	156	+42
1956	134.50	224	170	+54

[1] Data obtained from Survey of Current Business, U. S. Department of Commerce and from Newsprint Bulletin No. 16, Feb. 28, 1957, published by American Newsprint Publishers Association.

In substance this table means that while all wholesale commodity prices have gone up 70 percent from the 1945 price, newsprint prices have increased a whopping 124 percent. This has not been due to a shortage of wood, but rather a shortage of production capacity which has enabled manufacturers to raise prices at an accelerating speed.

That there will be a growing shortage of newsprint unless we install added capacity is the finding of a 1957 survey of the United States Department of Commerce.[2] Newsprint demand is growing so rapidly that the estimated demand in

[2] Technical Guide To Pulp, Paper and Board Supply-Demand (Demand Projections to 1965)—U. S. Department of Commerce, 1957, H. Rept. No. 573.

1965 will be 8.5 million tons per year compared with 7 million tons at present. This increased consumption will amount to more than 20 percent above our present level (75 new mills producing 100 tons per day). The chances of our importing this quantity from Canada are decreasing, but the opportunity for producing newsprint here at home from low-grade hardwoods is well assured. Since the American paper industry has not found it profitable to supply a large proportion of our domestic needs for newsprint but has tended to manufacture higher grades of paper, it is unlikely that private enterprise alone without some sort of stimulus as provided in this bill is likely to install the needed capacity in time to meet the demands.

5. NEED FOR NEW INDUSTRY

The Industrial Development News carried a list of 7,000 locally organized industrial development committees in its October 1957 issue similar to the one which I am representing (Douglas County, Wis.). Few of these communities needing industry will be successful in enticing many of our giant corporations to move their facilities—much as many of these areas may have to offer. Our rural communities need industry badly if they are to provide opportunities for young people and if we are to stem the tidal drift toward ever larger and more crowded metropolitan centers. Every community in America which needs industry has either the initiative, the raw materials, or the skilled manpower or all three to made the establishment of locally owned industry entirely economic. Very few have the capital needed to build increasingly complex production facilities demanded by today's technology. This bill gives great hope to many communities which hope to utilize their manpower and raw materials and available capital. And it can stimulate new, locally owned and controlled enterprises which have been the backbone of the American economic system until the recent great wave of mergers.

I. ASSURANCE OF FREEDOM FROM MONOPOLY PRICING

The Congress of The United States has investigated the rise in newsprint prices and the recurrent shortages no less than four times since World War II to my knowledge and it may have been more. The most recent was in the spring of 1957. None of these investigations have found the only answer—an expansion of production facilities. Although four new mills have been built in the South with the assistance in financing by the press, it is somewhat amazing to see the great American free press to accept so supinely the constant jacking up of newsprint prices and steady attrition by shortages without taking some action. The figures given above demonstrate that newsprint has been subject to monopolistic action beyond the slightest shadow of a doubt. The establishment of a series of regional independently owned and locally controlled newsprint mills based upon low-grade hardwoods would have a beneficial influence throughout America.

CONCLUSION

The industrial development committee of the Douglas County Board of Supervisors respectfully urges the Congress of the United States to pass this bill and to include within it adequate provision for the establishment of pilot plants to develop new forest industries including newsprint from low-grade hardwoods. We, likewise, urge the committee to include adequate provision for technical assistance and guidance by Federal agency specialists to assure efficient use of funds allowed. This should mean including adequate provision for pilot plant projects to development new methods, new uses and lower production costs.

EXHIBIT A

[Reprinted from Pulp & Paper, March 1958]

WHAT DOES IT COST TO MAKE PULP?

Average costs for making pulp

[Cost per ton O. D. pulp]

Raw material	Process	Raw material costs	Chemical costs	Overhead and operating costs	Total cost
Spruce	Unbleached sulfate	$61.50	$4.08	$33.98	$99.56
Do	Bleached sulfate	71.10	13.39	45.00	129.49
Pine	Unbleached sulfate	41.00	4.08	33.98	79.06
Do	Bleached sulfate	47.50	13.39	45.00	105.89
Aspen	Unbleached sulfate	24.20	3.63	33.28	61.11
Do	Bleached sulfate	26.50	11.22	43.31	81.03
Spruce	Unbleached sulfite	67.80	4.22	37.64	109.66
Do	Bleached sulfite	73.00	10.54	45.66	129.30
Aspen	NSSC—Corrugating	22.10	5.18	23.76	53 04
Do	NSSC—Semibleached	27.75	21.05	33.40	82 20
Do	Cold soda—Semibleached	18.45	15.82	26.26	60 53
Do	Groundwood	16.40	----------	23.89	40 29
Spruce	....do	41.40	----------	22 49	63 89
Aspen	Chemi—groundwood	25.25	3.03	24.34	52 62
Straw	Lime—corrugating board	18.80	1.38	26.14	46 32
Bagasse	Soda—board grade, 55 percent yield	17.00	15.10	27.43	59.53

Investment and Working Capital per ton per day

[100 ton mill basis—larger units would cost proportionately less]

Process	Investment	Working capital	Process	Investment	Working capital
Groundwood:			Sulfate:		
Unbleached	$25,000	$15,000	Unbleached	$60,000	$25,000
Bleached	33,000		Bleached	73,000	
Cold caustic soda:			Sulfite:		
Unbleached	25,000	16,000	Unbleached	50.000	25,000
Semibleached	34,000		Bleached	58,000	
Neutral sulfite:					
Unbleached	40,000	16,000			
Bleached	49,000				

At the Western Michigan University Conference, Dr. R. A. Diehm, professor of paper technology, WMU, distributed tables giving average costs of making sulfate, sulfite, and neutral sulfite, groundwood, and cold caustic soda pulps. The analysis was described as fitting the Lake States better than other sections, but may be applied nationally.

Dr. Diehm pointed out that only a few years ago, 90 percent of all pulpwood came from coniferous woods. Consumption of pulpwood is expected to reach 47,500,000 cords by 1975, of which 7,900,000 will come from waste wood products, he said. Use of hardwoods will increase. Dr. Diehm predicts cold soda will be more widely used. Straw may soon be extinct as a raw material but bagasse is looked on more favorably. Improvements in high yield processes are expected.

Mr. STODDARD. My name is Charles H. Stoddard, a consulting forester and working with the Industrial Development Committee of Douglas County, Wis.

Our group are particularly interested in forest products. We have a large area of second growth hardwoods coming up in that part of the country, which represent an opportunity for the newsprint industry.

In Wisconsin alone we are growing nearly 300 million cubic feet of hardwoods and are only utilizing 130 million.

In the Nation as a whole, we are growing 4 billion feet more than we are using. There is a new process which has been developed, the cold soda process, and also semichemical process, which makes possible the utilization of hardwood for the first time for newsprint purposes.

I have several exhibits here which indicate the approximate costs, and that this is both a technically feasible and economically feasible process.

It can be produced for about a hundred a ton. The current price of newsprint is about $135 a ton.

With regard to the question of demand, future demand, the Department of Commerce in a recent survey and report to the Congress estimated that we will need a billion and a half tons more by 1965, newsprint than we are producing today, that this would take about 75 new mills around the country producing 100 tons a day.

This represents quite an opportunity for new industrial development in a lot of communities that are looking for and need mills at a relatively small capital investment.

It would assure the press of this country a continued supply of paper and freedom from constant rise in prices and shortages which they have faced during recent years, which you gentlemen in Congress have been investigating no less than 4 or 5 times since 1945.

It will probably give you relief in the problem of investigating the newsprint shortage situation.

That, in substance, is what my testimony covers.

The CHAIRMAN. Thank you, Mr. Stoddard.

Mr. Hall, do you have an oral statement or do you desire to file it?

STATEMENT OF HUGH F. HALL, LEGISLATIVE ASSISTANT, AMERICAN FARM BUREAU FEDERATION

Mr. HALL. Yes, I have, Senator. My name is Hugh F. Hall. I am the legislative assistant in the Washington office of the American Farm Bureau Federation. I am pinch-hitting for Mr. Lynn, who had a dental appointment which he felt he had to meet or else wait an indeterminate period as I am sure you all know.

It will attempt to summarize this 5- or 6-page statement. In the first place, we set forth our resolution with respect to research, favoring, of course, all areas of research relating to agriculture, marketing, utilization, production, and home economics. I would mention at this point, too, the fact that we have long supported these areas of research to be developed by both Federal and State funds.

We believe, too, as other witnesses have said heretofore, that this is a proper function to be conducted within the Department of Agriculture.

We would suggest that an Assistant Secretary of Agriculture have all research within the Department under his administration, whereas, now, the Assistant Secretary who does cover this has a multitude of duties.

I do not recall the large number of employees that are in the Department, but the greater part of them are under the jurisdiction of the present Assistant Secretary, who also has research, so he has a large responsibility.

So we do favor the objectives that are mentioned in this bill, have done so for many, many years.

I might interpolate, too, I was with the Farm Bureau in the thirties, from 1934 on when the regional laboratories were set up under the authority of the Agricultural Adjustment Act of 1938.

We had in mind the very things that we are talking about here 20 years later. In the meantime, there has been the Research and Marketing Act of 1946, the objectives of which were similar, again indicating that it looks like about every 10 years or so, we rise up at this subject.

We could go overboard on utilization research, too. I think we have to say that. Utilization can't be divorced from production or marketing research. Indeed, the matter of classification of funds for these purposes is a debatable question.

To illustrate, cottonseed meal a few years ago could not be used for poultry or hog feed. Research has made it possible to adapt it as a protein feed for this class of production, and yet the funds are classified as production research.

So when we look at any figures dealing with production as against utilization research, I think we must bear in mind that there is an interrelation, and this question of classification is a bit dubious.

The Farm Bureau along with several of the other farm organizations and trade organizations, in 1956 had several conferences and developed what we call a long-range plan.

We sought, in the course of a 5-year period to increase the appropriations for the USDA research agencies by some $60 million or at the rate of $12 million a year.

We sought, also, to increase the Federal funds for grant-in-aid to the State experiment stations by $30 million over 5 years or $6 million a year.

We also indicated that it was desirable that the State governments increase their funds, we suggested, by $12 million a year beginning at that time.

Let's comment a little about the results of 3 years of this. This is in terms of appropriations by the Congress. I believe both you gentlemen are on the Senate Agricultural Appropriations Committee. If you will refer to the back page here, we have attempted to summarize the 3 years, 1957, 1958, and 1959 in our statement.

In 1957, the appropriation for research to the USDA agencies was increased by $15 million over 1956.

In 1958, the increase was $6 million, and this year, it is $5.1 million, a total for the three years of this 5-year program of $26 million.

In short, we are $10 million under the $12 million annual increase, which we had worked out as a suited goal for increased research.

In terms of the Federal funds provided for the State experiment stations—in 1957, we got a $5 million increase, in 1958, we got $800,000, a little less than a million increase, and in 1959, the stations get $1 million increase, a total of $7 million as against our objective of $18 million for grant-in-aid funds in these 3 years.

I would also call your attention to the total funds put up by the public from State and Federal funds for research.

In 1957, they amounted to $187 million, including the non-Federal funds, and in 1958 to $200 million. Of course, the 1959 figure is unavailable with respect to the funds which would be available from the States.

The States, however, in 1958 put up some $91 million, and there is an indication that the State funds this year will increase to something like $96 to $98 million.

The CHAIRMAN. I wish you would direct yourself to the bill, Mr. Hall, if you please, not as to what you did in the past.

Let's stick to the bill before us.

Mr. HALL. I do this for the purpose of indicating that considerable effort is going on.

The CHAIRMAN. I understand that.

Mr. HALL. And we want it to continue. We feel that it is desirable to continue to get these funds in this fashion.

Whether you pass the legislation proposed, money has got to be provided.

The CHAIRMAN. That is what I suggested this morning, that if the Department came up with a request for funds that they would probably get it.

I know that Senator Aiken here, myself, and Dick Russell from Georgia have increased it on our own. We have put in much more than what the Department desired.

Mr. HALL. You have increased the funds over the amounts which have come over in appropriation bills from the House.

Senator AIKEN. There have been proposals to increase it from time to time and we get the explanation that it has to be programed yet, and it is very conspicuous that the big increase has come in the utilization and marketing end of the research work.

Mr. HALL. Quite so. That is shown on our table.

Senator AIKEN. I think it is so far under utilization in the consumers end that it ought not to all be charged to the farm appropriation bill.

Mr. HALL. I have but two other observations.

Senator AIKEN. It is good work, however, wherever it is charged to.

Mr. HALL. In the hearings on the House side where the work of the year is extensively reviewed, on page 536 of part 2 of the House agriculture appropriations hearings this year, is a list of 68 patents issued to utilization research branches just during the calendar year 1957.

Reference has been made to contracting out this work, which is fine. We concur thoroughly in it.

On page 546 of the House hearings and subsequent pages, you will find a list of some 65 private corporations, associations such as some of those who appeared here today, engaged in cooperative and contract research with the Department of Agriculture on utilization.

On page 549, you will find a list of the State and other educational institutions with which cooperative work is underway. That list covers more than another page.

I suggest that a lot of very effective work is being done. We favor more work. We favor putting up more money to do it. We favor having an Assistant Secretary of Agriculture who can give his entire energies and time to directing it.

In summary, I urge that rather than establishing a new and separate agency, we favor that it be done within the Department, and that he have appropriate responsibility in directing the entire research activities.

That this long-range program that I have described, which is in process of materialization, be put into full operation with adequate funds.

May I say we make our appearances before the budget people in the executive agencies each year, and will continue to do so, and we would hope that since the Congress in any event has the ultimate say in respect to these matters, that we could get the Congress to respond even when the Budget Bureau doesn't.

Of course, there is the whole field of the basic laws governing price support and adjustment programs which have their bearing upon this total problem. Those representations on behalf of our organization have been made to you many times and we are not dwelling on them here.

That concludes our statement.

The CHAIRMAN. Thank you, Mr. Hall.

(The statement of John C. Lynn, legislative director, American Farm Bureau Federation, is as follows:)

We appreciate the opportunity of presenting the views of the American Farm Bureau Federation on the various legislative proposals concerning increased research in the industrial use of agricultural commodities. The Farm Bureau has a vital interest in our agricultural research program and has a long and continuing record in support of adequate funds for agricultural research, both at the national and State level.

The 1958 policy of the Farm Bureau on agricultural research, adopted by the voting delegates of the member State farm bureaus, is as follows:

"Agricultural research and the application of its findings are vital to the economic future of farm people.

"An expanded research program must be directed toward the practical needs of farm families. This program should emphasize:

"(1) Marketing research designed to lower marketing costs, improve the quality of agricultural products at the retail level, expand markets, and promote better nutrition.

"(2) Utilization research designed to find new and expanded uses for agricultural commodities, including industrial uses.

"(3) Production research designed to lower unit costs and increase opportunities for profit.

"We support adequate appropriated funds from Federal, State, and local sources to carry out the development and expansion of such a research program.

"We recognize our responsibility for eliminating wasteful expenditure of funds for nonessential research.

"Consideration should be given to the appointment of an additional Assistant Secretary of Agriculture who would assume leadership in developing and directing this expanded agricultural research program.

"We believe there are opportunities for expanding use of American agricultural commodities abroad through utilization and marketing research. This matter should be investigated and, where feasible, local currencies accumulated under Public Law 480 should be utilized for this research work."

In 1955 the American Farm Bureau Federation and other agricultural organizations developed a 5-year program for increased research for agriculture. This program provided for an increase of $18 million per year over a 5-year period for agricultural research with primary emphasis on marketing and utilization research (attachment No. 1).

This long-range program began in fiscal 1957 and will run through fiscal 1961. The Federal funds which have been appropriated for fiscal 1957 and 1958 were not as large as the goals set up under the long-range program. During 1957 and 1958 Federal research appropriations were increased about $26 million, $10 million less than our long-range program. An increase of about $3 million in research funds was recommended in the 1959 USDA budget. This is about $15 million less for the next fiscal year than the annual increase proposed by Farm Bureau's long-range program.

In presenting our views on the 1959 agricultural appropriation to the appropriate House and Senate committees, Farm Bureau recommended an increase of $25 million above the budget recommendation for agricultural research for fiscal 1959. This increased amount would have brought appropriation up to Farm Bureau's schedule for a long-range agricultural research program.

The Congress did not accept our recommendation and so the funds for agricultural research will probably be increased only about $6 million in fiscal 1959.

The Farm Bureau recognizes the need for additional utilization research designed to find new and expanded uses for agricultural commodities, including industrial uses. We recognize the surplus situation existing in agriculture today and the desirability of programs designed to expand consumption and help balance supply with effective market demand. There is no easy solution to this problem.

We have presented to this committee our recommendations for legislation designed to help adjust our agricultural production plant to effective demand. It is, of course, very essential that basic changes be made in the price support and adjustment program relating to agriculture if we are to avoid the continued accumulation of agricultural surpluses.

We would call to the attention of the committee part 2 of the appropriations hearings in the House. The United States Department of Agriculture has listed a great many breakthroughs in utilization research during the last year. These begin on page 479 and continue through to page 559. These examples are broken down into the various major categories such as animal husbandry, animal disease and pest control, crop research, entomology research, soil and water research, farm economics—cost of production research, agricultural engineering, and many others. Also we call your attention to a list of patents issued during the calendar year 1957, based on agricultural research accomplishments in many fields.

We are calling these facts to the attention of the committee, and would hasten to add that we are not satisfied with the progress being made in the United States Department of Agriculture with regard to research, but believe that we should build on this foundation that is already established in the Department of Agriculture and land-grant college system.

The various bills before this committee would establish a new and separate agency to direct and carry on a program of research for new uses of agricultural products, with emphasis on industrial uses. We are in general agreement with the need for increased activity on a well coordinated agricultural research program, but believe it can be accomplished in a far more effective manner by utilizing, to the fullest extent, existing research agencies and facilities. These would include the Agricultural Research Service in the United States Department of Agriculture, the regional experiment stations and laboratories and the land-grant college facilities that are available to carry out research work. In this way we could avoid expensive duplication of effort and utilize our present research facilities to their best advantage.

The Farm Bureau recognizes the vital importance of agricultural research to the economic future of not only farm people but to the whole United States population. An expanded research program in all phases of marketing, utilization, and production is important and should be given increased emphasis. Certainly, increased industrial uses of agricultural commodities is an important part of any agricultural research program. We would emphasize, however, that based on the best available information, there are many industrial uses for which agricultural products can now be put that are uneconomic from the producer's standpoint and would require subsidization through huge annual expenditures of public funds. We think that such a program would be greatly dependent on Federal appropriations, and would be unwise and would tend to give false hopes to some agricultural producers that there was a solid market for expanded production when, as a matter of fact, production of that particular commodity should be curtailed.

Industry is carrying on a great amount of utilization research to find new and improved uses for agricultural commodities. We understand that the Department of Agriculture is expanding their contract work with the business organizations who are set up to do utilization research and development within the industry. We are sure the members of this committee are very familiar with the outstanding work being done by fertilizer manufacturers, cereal producers, flour and other milling interests, the meat industry, the textile industry and many other major segments of industry who are spending more money perhaps than the Federal appropriation to USDA for agricultural research.

Our 1958 policies suggest that consideration should be given to the appointment of an additional Assistant Secretary of Agriculture who would assume

leadership in developing and directing an expanded agricultural research program. While the United States Department of Agriculture has done a good job in the agricultural research field, we believe that agricultural research is such an important matter that it should have the added leadership and direction that would be provided by an Assistant Secretary of Agriculture who would devote his time and energy to this task.

Some of the bills under consideration would make available rather large sums of money for research in the increased uses of agricultural products for industrial purposes. A sound agricultural research program is something that cannot be bought by just making available large sums of money. It involves the obtaining and development of adequately trained people to do the research work. Just the mere availability of funds alone is not enough, unless properly trained research people and facilities are also available or can be developed. Research carried on by improperly trained people would constitute a waste of both money and time.

As we pointed our earlier, the Farm Bureau has developed a long-range agricultural research program that provides for a gradual increase in appropriated funds over a 5-year period. We believe that if funds were appropriated for this program, it would be the basis for a sound expended agricultural research program.

Recognizing the need and importance of developing new and expanded uses for agricultural commodities, particularly industrial uses, we believe that the following program will go a long way in achieving the result that we are sure the members of this committee are interested in obtaining.

(1) Rather than establishing new and separate agencies for research in industrial uses of agricultural commodities, we recommend an expanded research program in this area, utilizing our existing research facilities and keeping the responsibility in the United States Department of Agriculture.

(2) We also suggest that in order to emphasize the importance of our agricultural research program that an additional Assistant Secretary of Agriculture be provided for, whose responsibility would be to direct the agricultural research activities in the USDA.

(3) That the long-range program suggested in attachment I of this statement be put into full operation.

(4) That changes be made in the basic laws govering the price support and adjustment programs so as to attempt to prevent excess agricultural production. The American Farm Bureau Federation has recommended a comprehensive program designed to accomplish the necessary adjustments in agriculture.

We will continue our efforts to assist the administrative agencies of Government and the Congress in developing programs and giving emphasis to projects that are designed to increase the results from agricultural research.

ATTACHMENT I

Long-range research and extension program basic program and appropriations 1957–59 excluding construction and capital outlays

[Millions of dollars]

	Long-range program		1957 appropriation	1957 increase over 1956	1958 appropriation	1958 increase over 1957	1959 appropriation	1959 increase over 1958
	Total increase in 5 years (beginning 1957)	Recommended annual increase						
Research: USDA agencies	$60	$12	$73.2	$15.0	$79.2	$6.0	[1] $84.3	$5.1
State experiment stations:								
Federal funds	30	6	29.8	5.0	30.6	.8	31.6	1.0
Non-Federal funds	60	12	84.4	8.1	[2] 91.0	6.6	([3])	([3])
Total experiment stations	90	18	114.2	28.1	121.6	7.4		
Total research	150	30	187.4	43.1	200.8	13.4		
Classification of funds appropriated to USDA agencies:								
Production			47.9	10.2	52.2	4.3	54.9	2.7
Utilization			14.2	3.0	15.3	1.1	17.9	2.6
Marketing			9.2	1.5	9.5	.3	9.5	
Home economics			1.9	.3	2.0	.1	2.0	
Total			73.2	15.0	79.0	[4] 5.8	84.3	5.3

[1] In addition, it is estimated that in 1959 up to $5,000,000 of foreign currencies received from sale of surplus agricultural commodities will be used for utilization research abroad.
[2] Estimate.
[3] Not available.
[4] Excludes budget reserve for savings of $220,000.

The CHAIRMAN. All right, Mr. Bescher. Will you step forward please?

STATEMENT OF RALPH H. BESCHER, ASSISTANT TO GENERAL MANAGER, WOOD PRESERVING DIVISION, KOPPERS CO., INC., PITTSBURGH, PA.

Mr. BESCHER. I am Ralph Bescher, of the Koppers Co., a member of the President's Task Force on Research for Forest Products.

I am glad to be here to testify in favor of this bill S. 2306. I want to have it recorded that my comments are those of the committee as a whole, which studied this problem very extensively, and it is reported in the President's report which might be used in reference.

The President appointed a bipartisan commission on increased industrial use of agricultural products and forest products.

I note that the bill speaks of agricultural products, but does not specifically speak of forests and forest products, and I believe that it would be very desirable from our point of view if the committee would either make this correction in their report in presenting the bill or maybe modify the bill to include that.

The CHAIRMAN. I think the growing of trees is considered a crop, isn't it?

Senator AIKEN. That is what most of the land that is being put in the conservation research is being put into, I think, particularly east of the Mississippi River.

The CHAIRMAN. We are glad you brought that to our attention and we will be glad to check into it, because we certainly intend to incorporate timber or forest products.

Senator AIKEN. It should certainly by improved.

Mr, BESCHER. On page 2, line 6, if you inserted the words after "existing agricultural products," "including forest products," you would cover the thing very easily, Mr. Chairman.

A forest products research and development program geared to current national requirements must be adequate to do a threefold job: (1) Supply the technical and scientific knowledge essential to the conversion of raw wood and bark into needed products for expanding industrial and consumer needs; (2) create the raw material values needed to make economic use of a vast reservoir of forest growth now unused and largely unusable, that constitutes a critical roadblock to more productive management of our forests; and (3) provide the basic data for the proper planning of the best possible wood crops for the future.

There is a paradox existing in this timber problem. As our forefathers came to this country, they cut the better trees and that situation is continuing to go on.

We have skimmed off the cream year after year of the forest land until now we have a shortage of high-quality trees, but we have a very large surplus of poor-quality trees.

Senator AIKEN. That is what ails our pulpwood industry even more than imports, I think.

Mr. BESCHER. That is right.

Senator AIKEN. The shortage of the proper quality of raw materials to keep the mills operating at a profit.

Mr. BESCHER. And that situation is most prevalent in the East, in the hardwood belt. Seventy-four percent of the standing timber in the hardwood fields and forests is poor grade or culled trees, and only 26 percent is high-grade or medium-grade trees.

I couldn't help but note that when Mr. Stoddard was proposing that they build a pulp plant using the semichemical and cold soda process for producing pulp in Wisconsin, that that was a direct result of research by the Forest Parks Research Laboratory at Madison. They are fully responsible for that and that process is being used now in some half a dozen paper companies commercially throughout the United States to produce not only newsprint, but to add to other things, including bond papers.

The program recommended by our task group is aimed primarily at the utilization of materials now in surplus—chiefly because existing processes cannot economically make use of them. These surpluses consist of unwanted old-growth timber; small or low-quality growing stock; unused or little-used species, largely hardwoods; thousands of acres of thinnings; materials discarded in processing, such as bark, mill refuse and chemical losses; and in the cases of naval stores, actual surpluses of a harvested commodity. Of major importance in the program of upgrading the productivity of much of the timbered areas, chiefly the woodlands, is the problem of conversion of the many stands of low-quality wood currently occupying the land and deterring the establishment and growth of more desirable species. This conversion should be based on economically sound processes many of which are still to be developed.

I wish to make special mention of the farm woodlands, that comprise one-third of all the privately owned commercial timberlands of the United States. They are readily accessible, but are the least productive of all our timbered areas, and contained many deformed, stunted and cull trees. To this farm woodlot acreage will be added the marginal farm land currently being encouraged to be brought under the soil bank program, and estimated to reach 50 million acres. It can be anticipated that the consumption of wood fiber in one form or another in the years to come will continue to increase, and that any land that is diverted back to a forest use would not only reduce the amount of cropland available for growing surplus crops, but would actually produce wealth and show a return on the investment. These acres are needed to meet the demand for wood as our population grows at the rate of 3 million people annually.

The recommended program would increase Federal expenditures in forest products research from $2,300,000 in 1957 to $13 million over a 10-year period. This program would include work by existing research agencies of the Department of Agriculture as well as contract research with other institutions and laboratories. It is our opinion that the expanded program should be administered by the existing research agencies of the Department of Agriculture in accordance with their present functional responsibilities.

Recognizing the need for the development of specialized scientific personnel, a part of the contract research should be granted to carefully selected educational institutions. This program would supplement other general programs of the Federal Government for developing research scientists.

The recommended program includes all types of research and development from fundamental investigations to pilot plant developments needed to establish the commercial feasibility of new and improved products and processes. Past pilot plant experience in such developments as sawmilling, semichemical pulping, glue laminating of timbers, prefabricated wood housing, wood-sugar hydrolysis and continuous steam distillation of gum naval stores should be drawn on for guidance in future developmental work through the engineering stages of equipment design and economic appraisal of commercial possibilities.

The speed of development of usable research knowledge will govern the rate at which development of commercial processes can be accomplished. It is difficult, if not impossible, to predict such progress. The expenditures for developmental work will fluctuate from year to year. Development should be pursued as fast as basic information for process development is secured.

The increase of a program of this magnitude of course would require a corresponding increase of research facilities. Funds will be needed to provide expansion of the Forest Products Laboratory at Madison, Wis., and also for financing pilot installations in other locations, such as the several Federal research stations. Full consideration should be given to cooperation with the several State and university facilities where the expansion of existing projects would produce added results, particularly in respect to the training of more research personnel.

As a matter of policy, our task group decided to be conservative in our recommendations. We have kept in mind the difficulty of securing research personnel. We have also given careful consideration to economy in organizing and prosecuting a program of this type. Accordingly, our recommendations can hardly be classed as a crash program. It is our opinion that the Nation requires a program of at least this magnitude if we are to meet our needs for forest products.

I personally feel—this is not the committee speaking, but me, personally, I think they would pretty much go along with it—that forest utilization has been somewhat neglected as farm crops go. Of the total quantity of products taken from the land, approximately $75 billion a year, of that quantity $25 billion or one-third is forest products.

Yet if we took at the research that is supported by the Government, there is $92 million worth of agricultural research and there is only $2 million in forest utilization.

It is a place that would be very fruitful in increasing the yield to farmers by making better use of this land that they have that is now being used on a marginal basis for the growing of other crops and also would improve their yield and income off of their farm woodlots.

There is one statement here which I believe we should clear up a little bit. While the task group's report may appear to recommend projects not too closely related to the problem of agricultural surpluses, it is our considered opinion that the approach is sound.

Our approach there, which isn't quite covered in the statement, is that we believe our objective basically is to improve the income picture to the farmer, and by carrying out these projects that does do that.

It improves, of course, the income for the whole country if we raise the income of any one segment. The whole program has been very carefully worked out and we fully recommend it.

I also have one other controversial thing I would like to mention to you and that is we feel it would be much better to keep this thing in the Department of Agriculture, maybe with some reorganization there in the way of Assistant Secretaries.

We feel that the number of scientists that know the wood utilization industry is quite limited, that if you set up a separate agency, you just create more chiefs and you have less Indians to work and I feel that they have done a remarkably fine job with the small amount of funds they have and I would hate to see it broken off and have two agencies instead of one.

In the forest products phases, the problems accrue from past and present utilization practices and the associated uneconomic timber stands and wood materials. This situation is not being overlooked, but the amount of attention that is being given to it by all agencies is far too little in respect to the potentiality of the resources. The view that the intensity of our forest research efforts must be increased by all agencies, both public and private, is agreed to by most all concerned.

The forest resource report of the Department of Agriculture, just released, cites much evidence to support this point. Our group feels that the Federal Government must take the lead in this very vital program.

The CHAIRMAN. Thank you, sir.

(Mr. Bescher's prepared statement is as follows:)

Since Senate Document 45 of the 85th Congress, 1st session, includes a statement regarding the organization of the Task Group on Forest Products, I will not include it here. I might say, however, that the group included men from industry and educational institutions with a broad intimate knowledge of this field.

A forest products research and development program geared to current national requirements must be adequate to do a threefold job: (1) Supply the technical and scientific knowledge essential to the conversion of raw wood and bark into needed products for expanding industrial and consumer needs; (2) create the raw material values needed to make economic use of a vast reservoir of forest growth now unused and largely unusable, that constitutes a critical roadblock to more productive management of our forests; and (3) provide the basic data for the proper planning of the best possible wood crops for the future.

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I wish to make special mention of the farm woodlands that comprise one-third of all the privately owned commercial timberlands of the United States. They are readily accessible but are the least productive of all our timbered areas, and contain many deformed, stunted and cull trees. To this farm woodlot acreage will be added the marginal farm land currently being encouraged to be brought under the soil-bank program, and estimated to reach 50 million acres. It can be anticipated that the consumption of wood fiber in one form or another in the years to come will continue to increase, and that any land that is diverted back to a forest use would not only reduce the amount of crop land available for growing surplus crops, but would actually produce wealth and show a return on the investment. These acres are needed to meet the demand for wood as our population grows at the rate of 3 million people annually.

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While the task group's report may appear to recommend projects not too closely related to the problem of agricultural surpluses, it is our considered opinion that the approach is sound. In the forest products phases, the problems accrue from past and present utilization practices and the associated uneconomic timber stands and wood materials. This situation is not being overlooked, but the amount of attention that is being given to it by all agencies is far too little in respect to the potentiality of the resources. The view that the intensity of our forest research efforts must be increased by all agencies, both public and private, is agreed to by most all concerned. The forest resource report of the Department of Agriculture, just released, cites much evidence to support this point. Our group feels that the Federal Government must take the lead in this very vital program.

The CHAIRMAN. Dr. Crandall? He is apparently not present.

Senator AIKEN. There was another representative from the same company.

The CHAIRMAN. Permission will be granted to him to file a statement for the record if he desires. You might notify him to that effect, Mr. Clerk.

Mr. Konen, from Minneapolis. Apparently he is not present. Notify him if he desires to file a statement; it will be included for the record.

Mr. Jackson, a moment ago you presented a statement by Mr. Newsom. Did you want to say anything about it or just leave it to be filed and placed in the record as you submitted it?

Mr. JACKSON. I seriously doubt that I could add anything to what you have heard here today. We do favor this legislation, and I think that just filing it in the record will suffice.

If you have any questions that I might be able to answer, I would be glad to try.

The CHAIRMAN. Is there anybody else who desires to be heard on the subject?

If not, the committee will stand in recess until 10 o'clock tomorrow.

(Whereupon, at 4:40 p. m., the committee adjourned to reconvene at 10 a. m., Thursday, June 5, 1958.)

(Additional statement filed for the record is as follows:)

STATEMENT FILED BY THE HON. ROMAN HRUSKA, A UNITED STATES SENATOR FROM THE STATE OF NEBRASKA

Mr. Chairman, it is my regret that most pressing commitments do not allow me to appear today before your committee to personally testify on increasing industrial use of agricultural products. It is heartening to know that my colleague Senator Carl Curtis, will appear before the committee. His experience in this field is of long standing and his remarks have my fullest endorsement.

It is also heartening to note the number of Nebraskans who are scheduled to give their views on the legislation pending in this vital area. Their testimony will, I am sure, demonstrate the vibrant interest of all Nebraskans—farmers, agricultural organizations, educators, businessmen, and others— in getting proven methods of increasing industrial use of farm products out of the laboratory and onto the production line.

It is the positive approach of this legislation, Mr. Chairman, which commends itself to Nebraska people. As citizens of one of the Nation's agricultural States, Nebraskans have long been concerned with the problem of overproduction of farm products. In truth it is a problem of underconsumption, as we all know.

Nebraska farmers, as well as those all over the Nation, have made tremendous strides in recent years in improving the efficiency and economy of their operations. The result has been a rich harvest of new and improved farm products which have made a solid contribution to increasing the health and well-being of the American people.

Good progress has been made in various surplus disposal programs, as you are aware. The increasing effectiveness of the Public Law 480 program in reducing our surplus stockpiles has been most reassuring. Nevertheless, the need remains great to stimulate increased consumption of farm products—in the home, on the feedlot, and in the factory.

It would be a national tragedy if this rich harvest could not be utilized to the fullest. The answer is clear: It has been demonstrated time and again in the research laboratories of industry, university, and Government. Techniques and processes numbering in the hundreds have been proven to utilize food and fiber to make new or improved manufactured products.

To date, the farmer has been losing the research battle at an alarming rate. Not only has his efficiency improved through research but research has given industry new materials and methods which have reduced its use of agriculture products in its manufacturing.

Great strides have been made in promoting utilization research. The Department of Agriculture will spend some $26 million on such research in fiscal 1959. Four Agricultural Research Service laboratories are now engaged in utilization studies and experiments.

But only about 7 percent of the food and fiber produced on American farms today is finding its way into manufacturing processes. The promise is greater than that, Mr. Chairman, both for new goods and products from industry and for putting to more positive use our bountiful agricultural production.

It is my fervent hope that the committee will give careful attention to various proposals for stimulating industrial utilization of farm products. Such a program is not a panacea: It will not remove overnight our surplus stockpile, now estimated at $7.3 billion worth of food and fiber. But it does hold great promise for farmer and manufacturer alike.

A program for industrial utilization of agricultural products would be a concrete, long-range, positive contribution to continuing the progress of America in insuring the health and well-being of all its citizens.

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